APPENDIX 3

ORIGINAL DoN STAFF SUMMARY

STAFF REPORT TO THE PUBLIC HEALTH COUNCIL FOR A DETERMINATION OF NEED	
Applicant Name	Mass General Brigham Incorporated
Applicant Address	800 Boylston Street, Suite 1150 Boston, MA 02199
Filing Date	February 12, 2021
Type of DoN Application	Substantial Capital Expenditure Substantial Change in Service
Total Value	$1,875,274,238.00
Project Number	MGB-20121612-HE
Ten Taxpayer Group (TTG)	11 formed
Community Health Initiative (CHI)	$93,763,711.90
Staff Recommendation	Partial Approval with Conditions
Public Health Council	May 4, 2022

Project Summary and Regulatory Review

Mass General Brigham Incorporated (MGB or Applicant) submitted an application for a Proposed Project at Massachusetts General Hospital (MGH) for the construction of a new tower on the MGH Main Campus that will contain the following:

- 482 private beds, including 418 private medical/surgical (M/S) beds and 64 intensive care unit (ICU) beds, of which, 364 existing semi-private M/S beds and 24 ICU beds (388 total) beds will be transferred from other buildings on MGH's Main Campus. The Proposed Project will result in net new 94 licensed beds (54 new M/S beds; 40 new ICU beds).
- Outpatient oncology services relocated from current buildings on the MGH Main Campus and expanded to include 100 oncology infusion bays (a net increase of 21) and 120 oncology exam rooms (a net decrease of three).
- Cardiac services relocated from current buildings on the MGH Main Campus and expanded. Five (5) operating rooms (OR) currently dedicated to cardiology and nine (9) rooms currently serving as catherization and electrophysiology (EP) rooms will be moved to the new tower as hybrid ORs. The Proposed Project includes one (1) new OR dedicated to cardiology and eight (8) new hybrid ORs. In addition, there will be three (3) new procedure rooms dedicated to cardiology.

- New diagnostic imaging equipment. Two (2) new computed tomography (CT) units, two new magnetic resonance imaging (MRI) units, two (2) new positron emission tomography-computed tomography (PET/CT) units, and one (1) new positron emission tomography-magnetic resonance (PET/MR) unit.
- Other clinical services renovation projects at MGH's Main Campus and licensed satellites.

The capital expenditure for the Proposed Project is $1,875,274,238.00. The CHI contribution is $93,763,711.90.

Review of Applications for Capital Expenditures and Substantial Changes in Service is under the DoN regulation 105 CMR 100.000. The Department must determine that need exists for a Proposed Project, on the basis of material in the record, where the Applicant makes a clear and convincing demonstration that the Proposed Project meets each Determination of Need Factor set forth within 105 CMR 100.210. This staff report addresses each of the six factors set forth in the regulation.

The Department received written comments and held a virtual public hearing on March 23, 2021. A list of commenters and summaries of the comments received can be found in Appendices VII through X.

Eleven groups registered as Ten Taxpayer Groups (TTGs).

The Department required an independent cost-analysis (ICA) for the Proposed Project. A summary of the ICA findings can be found in Factor 2.

The Department received written comments on the ICA from Parties of Record, also discussed in Factor 2.

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Background (Mass General Brigham, MGH and Application Overview)

The Applicant, Mass General Brigham Incorporated (MGB), is a Massachusetts not-for-profit corporation, located at 800 Boylston Street, Suite 1150, Boston, Massachusetts 02199. MGB had 19.7% of all acute care hospital discharges in Massachusetts in FY19, the highest share of discharges among multihospital systems.[a]

The Applicant is currently comprised of the following acute and non-acute care facilities in Massachusetts by type:

Acute Hospital	**Type (Per CHIA Category[b])**
1. Brigham and Women's Hospital	Academic Medical Center
2. Massachusetts General Hospital	Academic Medical Center
3. Massachusetts Eye and Ear Infirmary	Specialty Hospital
4. Brigham and Women's Faulkner Hospital	Community Hospital
5. Newton-Wellesley Hospital	Community Hospital
6. Cooley Dickinson Hospital	Community Hospital
7. Martha's Vineyard Hospital	Community Hospital
8. Nantucket Cottage Hospital	Community Hospital
9. North Shore Medical Center	Community High Public Payer Hospital
Non-Acute Hospital	
1. McLean Hospital	Psychiatric Hospital
2. Spaulding Rehabilitation Hospital	Rehabilitation Hospital

It also operates a home health agency, Mass General Brigham Home Care.

Its hospitals are principal teaching affiliates of the medical and dental schools of Harvard University; and it operates a graduate level program for health sciences.

Its physician network comprises approximately 7,500 employed and affiliated primary care and specialty care physicians that include:

1. Brigham and Women's Physicians Organization,
2. Massachusetts General Physicians Organization,
3. Newton-Wellesley Medical Group,
4. North Shore Physicians Group,
5. Cooley Dickinson Physician Hospital Organization (PHO), and
6. Mass General Brigham Community Physicians.

It operates both a for-profit insurance company, and a non-profit managed care organization that provide health insurance, and administrative services products to commercial populations and the MassHealth Program (Medicaid), and ConnectorCare. Mass General Brigham Inc. is a Health Policy Commission-certified ACO, under the name Mass General Brigham Incorporated, inclusive of Mass General Brigham Accountable Care Organization, LLC.[c,d]

In addition, it maintains the Mass General Research Institute, and the Brigham Research Institute; both are private, non-profit medical research enterprises.

The Applicant states its four-part mission is to provide patient care, research, education and community service, and that as discussed herein, this project will contribute to this goal.

Massachusetts General Hospital (MGH), the site of the Proposed Project, is one of the founding members of MGB and the original teaching hospital of Harvard Medical School. MGH is an academic medical center (AMC) with 1,043 licensed beds at its Main Campus in Boston, making it the largest hospital in Massachusetts. MGH offers services to patients through various hospital satellite and clinical locations across Eastern Massachusetts. MGH is a Level 1 Adult Trauma Center and Level 1 Pediatric Trauma Center.

Application Overview (Proposed Project)

The Proposed Project consists of the construction of a new building that will contain the following (also shown in Table 1 below):

- 482 private beds, including 418 private M/S beds and 64 intensive care unit (ICU) beds, of which, 364 existing semi-private M/S beds and 24 ICU beds (388 total) beds will be transferred from other buildings on MGH's Main Campus. The Proposed Project will result in net new 94 licensed beds (54 new M/S beds; 40 new ICU beds).
- Outpatient oncology services relocated from current buildings on the MGH Main Campus and expanded to include 100 oncology infusion bays (a net increase of 21) and 120 oncology exam rooms (a net decrease of three (3)).
- Cardiac services relocated from current buildings on the MGH Main Campus and expanded to result in 23 cardiac operating rooms. These rooms will be composed of six conventional operating rooms (a net increase of one (1) and 17 hybrid multipurpose operating rooms (a net increase of eight (8)). In addition, there will be three (3) new procedure rooms dedicated to cardiology and 50 new perioperative bays.
- New diagnostic imaging equipment. Two (2) new computed tomography (CT) units, two (2) new magnetic resonance imaging (MRI) units, two (2) new positron emission tomography-computed tomography (PET/CT) units, and one (1) new positron emission tomography-magnetic resonance (PET/MR) unit.
- Other clinical services renovation projects at MGH's Main Campus and licensed satellites.

Table 1: Proposed Project

	Current # at Current Location	# Transferring from Current Location	# New at Proposed Site (additional)	Total # at Proposed Site	# Remaining at current location	Total at MGH Boston campus after project implemented
Licensed Beds						
Inpatient Beds	1,043	388 (364 existing semi-private M/S beds and 24 ICU beds)	94 licensed beds (54 new M/S beds; 40 new ICU beds).	482	655	1,137
Cardiology Services – Relocated and Expanded						
Conventional OR's Dedicated to Cardiology	5	5	1	6	0	6
Hybrid multipurpose ORs Dedicated to Cardiology	9[1]	0	8	17	0	17
Procedure Rooms dedicated to Cardiology	0	0	3	3	0	3
Perioperative Bays	18	18	50	68	0	68
Oncology Services – Relocated and Expanded						
Exam Rooms (Oncology)	123	120	0	120	0	120
Infusion Bays	79	79	21	100	0	100
Imaging Services						
CT	14	0	2	2	14	16
MRI	10	0	2	2	10	12
PET/CT	3	0	2	2	3	5
PET/MR	1	0	1	1	1	2

[1] Previously categorized as Electrophysiology or Catheterization rooms. The Department updated licensing of these rooms based on Facility Guidelines Institute recommendations https://www.fgiguidelines.org/wp-content/uploads/2019/10/FGI_determining_appropriate_room_type_191024.pdf

As part of the requirement to consolidate into one DoN application all planned construction and renovation at a licensed facility over the course of a single federal fiscal year (FFY), the Application also includes the other renovation projects at MGH's Main Campus and satellite locations[2] listed below. Staff acknowledges a need for these renovation projects, and they will not be discussed further in this report.

- **Emergency Department (ED) Bays**. Renovation will convert all ED bays to negative pressure.
- **Molecular Pathology Lab**. Minor renovation will create functional workspaces and improve operations.
- **Bigelow Building**. Renovation of a storage room to convert it to a peripherally inserted central catheter (PICC) treatment room. Renovation will expedite the discharge of patients awaiting placement of a PICC line and allow staff to troubleshoot existing PICC lines, avoiding ED delays.
- **Gray and Jackson Buildings**. Renovation of induction rooms. These rooms will be repurposed for staff workrooms and storage space in compliance with regulatory requirements as well as provide a centralized Immediate Use Steam Sterilization room to enhance efficiencies in the operating rooms.
- **Ellison 2**. Replacement of interventional radiology imaging equipment through the acquisition of a Siemens High-Powered C-Arm to replace the existing equipment that has reached the end of its life.
- **Lunder 6**. Renovation to create a neuroscience-specific receiving unit which will allow for expedited transfers of emergency neurology patients, resulting in ED avoidance.
- **Gray 2**. Renovation to Interventional Room 6 to replace the existing room and update imaging equipment that has reached end of its life.
- **Bulfinch**. Renovation to PET production facility to meet current FDA regulatory compliance standards.
- Renovation to establish new **Homeless Clinic**. This renovation will provide additional support to the homeless population, allowing private exam and consultation space.
- **Hospital's Charles River Plaza Endoscopy Satellite**. Renovation of operating rooms. Renovation will provide updates necessary to meet current high-level disinfection regulatory standards.
- **Yawkey Oncology Pharmacy**. Renovation will expand the pharmacy to provide additional support due to increases in Oncology and Medical infusion volume and Phase 1 research trials.
- **Yawkey 3.** Renovation to convert the podiatry office to exam rooms in order to accommodate increased podiatry volume.
- **MGH Waltham Ambulatory Surgery Center**. Install new flooring in four orthopedic operating rooms, including upgrades to meet current industry standards.

[2] The Applicant originally included in its application renovation at the ambulatory care center in Danvers. However, the Danvers project is for the replacement of major moveable equipment (MME) the costs for which are not counted for DoN purposes, so the project should not have been listed in the DoN application. DoN staff concur that is it not a DoN event and will not consider it in the review of this application.

Patient Panel[3]

The MGB Patient Panel consisted of 1,611,095 patients, in fiscal year 2020 (FY20).[4] As shown in Table 2, the number of patients utilizing MGB's services increased by 7% between FY18 to FY20.

Table 2: MGB Patient Panel

FY18	FY19	FY20	% Change FY18-FY20
1,504,625	1,528,359	1,611,095	7.1%

Patient Panel and Patient Population Information (FY19)

Patient Panel refers to the patients in the MGB system. As this report focuses primarily on MGH, discussion of those patients alone will refer to that group of patients at the "patient population."

Table 3 presents Patient Panel information for MGB (Applicant) and patient population data (a subset of the MGB Patient Panel) for MGH (site of Proposed Project) patients. The MGB Patient Population is inclusive of the MGH patient population.

Staff notes the following observations about these data below:

- **Age:** The 18-64 age group represents the majority of MGB (62.1%) and MGH (58.5%) patients, followed by patients ages 65 and over who represent ~26% and 27% of the MGB and MGH patient populations.
- **Race/Ethnicity:** Approximately 73% of MGB and MGH patients identify as White.
- **Patient Origin:** Of the six health service areas (HSAs), for both MGB's and MGH's patient populations, a plurality originate from HSA 4 (44.6% and 48.5%- respectively).[5] A map of the HSAs can be found in Appendix XIII.

[3] As defined in 105 CMR 100.100, Patient Panel is the total of the individual patients regardless of payer, including those patients seen within an emergency department(s) if applicable, seen over the course of the most recent complete 36-month period by the Applicant or Holder.

[4] The Applicant states that utilization of patient care services at the following Mass General Brigham provider organizations was used to determine the Applicant's Patient Panel: Brigham and Women's Hospital, Brigham and Women's Faulkner Hospital, The General Hospital Corporation d/b/a Massachusetts General Hospital, Newton-Wellesley Hospital, North Shore Medical Center, Cooley Dickinson Hospital, Martha's Vineyard Hospital, McLean Hospital, Nantucket Cottage Hospital (post-Epic data only), Massachusetts Eye and Ear Infirmary (post-Epic data for specific locations only), Spaulding Rehabilitation Hospital (excluding data for certain programs), Brigham and Women's Physicians Organization, Massachusetts General Physicians Organization, Newton-Wellesley Medical Group, North Shore Physicians Group, Cooley Dickinson PHO (post-Epic data only) and Mass General Brigham Community Physicians (excluding pre-Epic non-risk patients).

[5] HSA 4 includes the following cities/towns: Acton, Arlington, Ashland, Bedford, Belmont, Boston, Boxborough, Braintree, Brookline, Burlington, Cambridge, Canton, Carlisle, Chelsea, Cohasset, Concord, Dedham Dover, Foxborough, Framingham, Hingham, Holbrook, Holliston, Hopkinton, Hudson, Hull, Lexington, Lincoln, Littleton, Marlborough, Maynard, Medfield, Millis, Milton, Natick, Needham, Newton, Norfolk, Northborough, Norwell, Norwood, Quincy, Randolph, Revere, Scituate, Sharon, Sherborn, Somerville, Southborough, Stow, Sudbury, Walpole, Waltham, Watertown, Wayland, Wellesley, Westborough, Weston, Westwood, Weymouth, Wilmington, Winchester, Winthrop, Woburn, and Wrentham.

- **Payer Mix:** There is a higher percentage of MassHealth, Managed Medicaid (MassHealth ACO), and Medicare FFS at MGH than at the MGB overall; The percent of commercial Medicare (5.1% vs. 4.9%) and commercial payers (58.7% vs. 58.4%) is higher at MGB than within MGH patients.
- **ACO and Alternative Payment Method (APM) Contracts:** In CY19, 57.9% of the MGB primary care lives were covered in risk contracts. The Applicant notes that this percentage is derived from the number of primary care lives within the patient panels of the MGB primary care physicians (PCPs) that are covered under risk contracts (in which MGB bears the risk).[6] For MGH, the affiliated PCP group is Mass General Physician's Organization (MGPO) and in CY19, 61.4% of MGPO's primary care lives were covered in risk contracts.

Table 3: Overview of MGB and MGH Patient Populations

	MGB	MGH
Total Unique Patients (FY19)	1,528,359	588,833
Gender		
Female	57.8%	55.1%
Male	42.2%	44.9%
Total	100.0%	100.0%
Age		
0-17	11.7%	14.2%
18-64	62.1%	58.5%
65+	26.2%	27.3%
Total	100.0%	100.0%
Race/Ethnicity[7]		
White	73.4%	72.8%
Black or African American	5.6%	5.3%
Asian	4.4%	5.3%
Hispanic/Latino	1.3%	0.7%
Native Hawaiian or Other Pacific Islander	0.1%	0.1%
American Indian or Alaska Native	0.1%	0.1%
Other/Unknown[8]	15.2%	15.8%
Total	100.1%	100.1%
Patient Origin		
HSA_1	6.6%	1.4%
HSA_2	3.4%	3.6%

[6] The Applicant explained that the data does not include referral patients because those patients are not managed by a MGB PCP and are not included in MGB's risk contracts.
[7] Self-reported. The Applicant states that patients were grouped into these categories based on how they self-identified and there is a portion of the patient population that chose not to report their race or identified as a race that did not align with the categories that are listed. Therefore, the racial composition of patients may be understated.
[8] A portion of the patient population either chose not to report their race or identified as a race that did not align with the above categories.

HSA_3	6.7%	5.9%
HSA_4	44.6%	48.5%
HSA_5	11.4%	8.0%
HSA_6	16.0%	17.4%
Outside of MA	11.0%	14.7%
Unknown/In MA but not in HSA_1-6	0.4%	0.4%
Total	100.1%	99.9%
Payer Mix[9]		
Commercial[10]	58.7%	58.4%
PPO/Indemnity	37.4%	38.2%
HMO/POS	21.3%	20.2%
MassHealth	1.6%	1.8%
Managed Medicaid	6.3%	7.1%
Commercial Medicare	5.1%	4.9%
Medicare FFS	22.7%	23.8%
Free Care/Health Safety Net	0.1%	0.2%
All Other[11]	5.3%	3.8%
Total	99.8%	100.0%
APM Contract Percentages[12]		
ACO and APM Contracts	57.9%	61.4%

Table 4 below presents patient information for each project component of this DoN Application by service line. Some highlights from the data include:

- A higher percentage of males among the cardiac patient population as compared to cancer and M/S patient populations.
- Patients aged 65 and older made up 59% of cancer patients, 70% of cardiac patients, and 51% of M/S patients.
- Approximately 80% of cancer, cardiac, and M/S patient populations are White.
- The majority of cancer, cardiac, and M/S patients reside in HSA_4. For cancer and M/S, the next largest group of patients come from outside Massachusetts.

[9] The Applicant states that the increase in Managed Medicaid and decrease in MassHealth percentages from FY18 to FY19 is due to the fact that Mass General Brigham began grouping MassHealth ACO's (Models A, B, and C) as Managed Medicaid in FY19.

[10] The Applicant states "Commercial" includes but is not limited to: Always Health Partners, Aetna, Blue Cross Blue Shield, Cigna, Fallon Health, Harvard Pilgrim Health Care, Tufts Health Plan, UnitedHealthcare, and many other smaller plans.

[11] The Applicant states category "All Other" includes but is not limited to Self-pay, International, Other Governmental (e.g., Tricare, Veterans), and Worker's Compensation for Mass General Brigham, and includes categories Government Other, Other Payor, Self-Pay, Workers Comp, and Unknown Summary Payor for MGH.

[12] The Applicant notes this is for any system-affiliated PCP's. The Applicant states that there are numerous factors to consider when developing the calculation for non-ACO and/or non-managed care contracts and Mass General Brigham staff are working on how to best provide this information so that it may be reported to the Department.

Table 4: MGH Inpatient Service Lines by Unique Patient (FY19)

	Cancer		Cardiac		M/S	
MGH Total	**#**	**%**	**#**	**%**	**#**	**%**
Gender						
Female	3,137	48.6%	2,123	38.6%	9,870	48.1%
Male/Unknown[13]	3,323	51.4%	3,377	61.4%	10,656	51.9%
Total	6,460	100.0%	5,500	100.0%	20,526	100.0%
Age						
0-54	1,213	18.8%	718	13.1%	6,337	30.9%
55-64	1,430	22.1%	957	17.4%	3,824	18.6%
65-74	1,967	30.4%	1,502	27.3%	4,539	22.1%
75-84	1,343	20.8%	1,354	24.6%	3,510	17.1%
85+	507	7.8%	969	17.6%	2,316	11.3%
Total	6,460	100.0%	5,500	100.0%	20,526	100.0%
Race						
Asian	269	4.2%	172	3.1%	681	3.3%
Black or African American	269	4.2%	282	5.1%	1,258	6.1%
Hispanic/Latino	16	0.2%	17	0.3%	71	0.3%
Other/Unknown, American Indian or Alaska Native & Native Hawaiian or Other Pacific Islander	490	7.6%	484	8.8%	2,100	10.2%
White	5,416	83.8%	4,545	82.6%	16,416	80.0%
Total	6,460	100.0%	5,500	99.9%	20,526	99.9%
Patient Origin						
HSA_1	193	3.0%	95	1.7%	428	2.1%
HSA_2	272	4.2%	185	3.4%	703	3.4%
HSA_3	510	7.9%	368	6.7%	1,245	6.1%
HSA_4	2,261	35.0%	2,523	45.9%	9,213	44.9%
HSA_5	733	11.3%	519	9.4%	2,140	10.4%
HSA_6	950	14.7%	920	16.7%	3,167	15.4%
Outside of MA	1,488	23.0%	861	15.7%	3,513	17.1%
Unknown	53	0.8%	29	0.5%	117	0.6%
Total	6,460	100.0%	5,500	100.0%	20,526	100.0%

[13] Includes "Unknown" for confidentiality due to counts <11

Factor 1: a) Patient Panel Need

In this section, we assess if the Applicant has sufficiently demonstrated need for the Proposed Project components by the Applicant's Patient Panel.

Through the Proposed Project, the Applicant states they will improve and maximize inpatient capacity to alleviate capacity constraints at MGH's Main Campus and ensure its Patient Panel demand for medical/surgical (M/S) and intensive care unit (ICU) patients is met, particularly for cancer and cardiac patients. The Applicant proposes to construct a new tower to:

- Reduce its number of semi-private rooms and increase the number of private inpatient rooms.[14]
- Relocate, expand, and co-locate both its cancer and cardiac services.
- Increase imaging capacity through the addition of diagnostic imaging equipment.
- Strengthen MGH's role as a regional resource.
- Improve MGH's disaster preparedness.

The stated need for the Proposed Project is complex, with many inter-related parts. To address all relevant pieces, this section of the report will be organized as follows: need for inpatient beds, need for imaging, and need for co-located cancer and cardiac services. Each of these areas will have several subsections describing elements that contribute to that need. After describing the need, an explanation of how the Proposed Project will address the need will be provided. Additionally, there will be discussion of MGH's roles as a regional resource and proposed improvements for disaster preparedness.

I. Need for Inpatient Beds

The Applicant asserts that Patient Panel need for inpatient beds is the result of several elements that result in capacity constraints and cannot be resolved without construction of new infrastructure. A summary table is located in Appendix II.

Staff note the following themes about the Proposed Project components:

- Physical plant issues.
- Lack of inpatient beds.
- Inability to transfer patients to MGH from community hospitals.
- Changing patient populations.

a. Aging Infrastructure and Double-Bedded Rooms; Bed Blocks

Presently, one third of inpatient care on MGH's Main Campus is provided in facilities built in 1940 and 1969 when private rooms were uncommon, and more than half of the hospitals' beds are in semi-private rooms (62%). The preponderance of semi-private rooms means bed blocks,

[14] the Hospital will close 388 existing semi-private beds and construct 482 new private rooms, increasing the overall percentage of single-bed medical/surgical rooms across the Hospital from 38% to 88%.

which occur when a licensed and operational bed is temporarily closed and cannot be used for patient care, have significant impact on the facility's ability to admit patients. Causes of bed blocks include infectious disease control, gender or age mismatches, patients requiring end-of-life care, and patients exhibiting disruptive behavior MGH experiences about 30 to 50 beds blocked each day accounting for about 4% of beds. From January 2019 to September 2019, each blocked bed was closed for an average of 1.9 days, and the monthly total closed bed days ranged from 1,206 to 2,160. In January 2019 alone, throughout the campus there were 1,121 instances of bed closures and 2,160 total days of bed closures.

Loss of available beds because of bed blocks results in longer wait times for patients to be admitted to an inpatient bed. These patients may originate as transfers or from other hospital locations, including through the ED and the PACU. These bed blocks increase boarding and longer lengths of stay in those locations, and ED crowding. It also leads to higher occupancy rates and prevents transfers of patients to MGH from community hospitals.

b. Emergency Department (ED) Throughput

MGH operates a high-volume, 68-bay ED. The MGH ED treats high acuity patients throughout the region and serves as the local ED for residents of Boston and across Suffolk County. ED visits increased from 108,741 to 113,297 (4%) between FY17 and FY19. The ED averaged 310 patients per day in FY19. Approximately 25% of ED patients were admitted to the hospital each year from FY17-FY19.

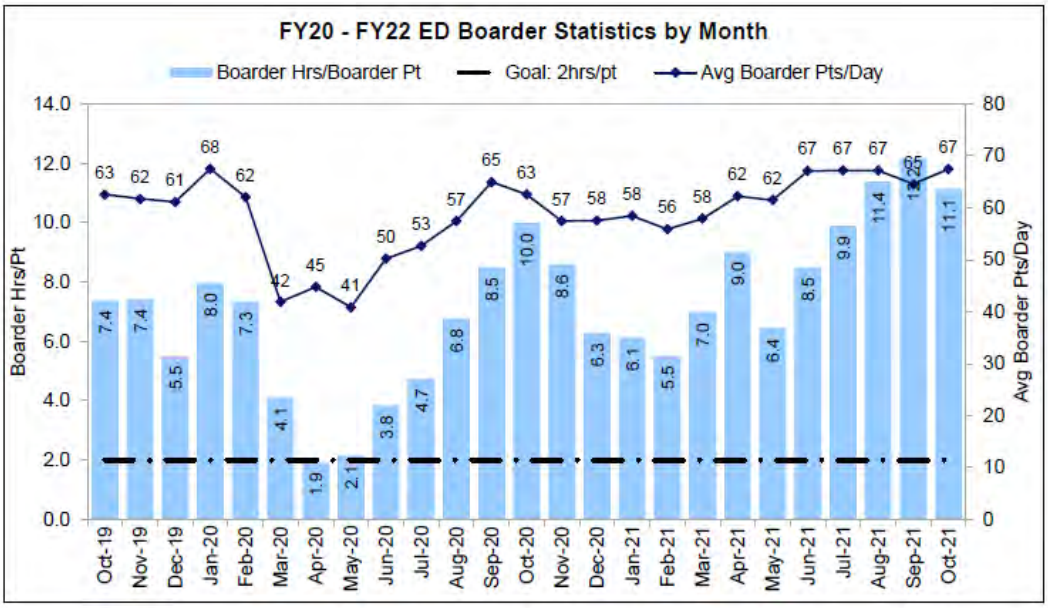
The downstream effects of the reduced inpatient bed availability caused by blocked beds include ED boarding and reduced capacity in the ED for patients waiting for evaluation and treatment, leading to increased wait times and ED crowding.[15] In FY19, 78% of all MGH patients admitted to an inpatient bed boarded in the ED for more than two hours following a bed request.

The impact of ED crowding on quality of care and outcomes has been documented and includes: treatment of patients in hallways, increased length of stay (LOS)[e] for admitted patients, patients leaving prior to completion of treatment, increased morbidity and mortality for both boarded and admitted ED patients, and decreased patient satisfaction.[f,g] In FY19, 2.5% of patients presenting to the ED left without any treatment, 1.3% left without completing treatment, and as ED boarding can slow the rate at which patients in the waiting room are even seen, 1.2% of patients presenting to the ED left without being seen at all.

The Applicant provided Figure 1 below which is a two-year trend chart showing the average number of patients boarding in the ED per day (line with y-axis on the right) and the average LOS or hours boarding per patient (bars with y-axis on the left). After a dip at the beginning of the pandemic, boarder statistics have remained relatively consistent over time.

[15] ED boarding is a primary cause of ED crowding. The American College of Emergency Physicians states that "crowding occurs when the identified need for emergency services exceeds available resources for patient care in the emergency department (ED), hospital, or both."

Figure 1: Boarder Statistics by Month



High ED boarding rates require MGH to implement Code Help in accordance with the DPH requirements.[16] According to DPH guidance, when Code Help is activated, the MGH ED must continue to accept ambulance traffic, but may no longer accept patients transferred from community hospitals.[17] The time MGH operated in Code Help steadily increased from 5% in FY17 to 10% in FY18 and to 20% in FY19 which the Applicant attributed to increases in census in the ED, high occupancy rates, longer inpatient stays, closed inpatient beds (e.g., due to infection control), and delays in testing and moving patients to an inpatient floor. Of note, ED boarding impacts high acuity patients at two points, those who are waiting for admission to an inpatient bed, and those who cannot be transferred to MGH from a community hospital when Code Help is activated.

c. Post Anesthesia Care Unit (PACU) Throughput

The PACU is an intermediate area where patients recover following surgery or other procedures. Some patients are discharged home from the PACU, while others require admission to an inpatient bed for an extended recovery period. In FY19, 5,292 patients boarded in the MGH PACU while waiting for an inpatient bed. An average of 22 patients per day remained in the PACU overnight while waiting for an inpatient bed. This slows down the throughput of surgical patients, impacting the surgical schedule.

d. Transfers from Community Hospitals

MGH provides a significant amount of tertiary and quaternary level care to high-acuity patients who are referred to MGH from other hospitals in Massachusetts and neighboring states, as well as national and international patients. The Applicant states that inadequate inpatient capacity

[16] Code Help plans for hospitals. https://www.mass.gov/lists/code-help-plans-for-hospitals
[17] As of August 2020, the Applicant defines Code Help status as ED patient census (acute and urgent) greater than 52, and 20 or more patients waiting to be admitted.

results in transfer delays and denial of patients who require the expertise and resources of an AMC, thereby preventing patients from receiving care that is not available at a community hospital.[18] In CY19, MGH accepted 5,229 transfers and lost 457 (8.7%) transfer patients, a trend that repeated in the first two months of CY20 (868 transfers and 68 (7.8%) lost).[19]

e. High Acuity Patients

The Applicant states that MGH provides high acuity care that is not readily available throughout the Commonwealth, and additional inpatient capacity at MGH is needed to support the provision of such care. The Applicant reported the total case mix index (CMI) at MGH in FY19 was 2.03 and average LOS was 6.13 days. Among high acuity patients, average CMI was 4.48 and average LOS was 9.48 while low acuity patients had an average CMI of 1.63 and an average LOS of 5.57. High acuity or tertiary patients utilized 15% of the Hospital's beds (accounting for 199 beds), experienced longer LOS, and represented more bed days than any other patient cohort. Longer lengths of stay among the high acuity patients further constrains bed availability.

f. Inpatient Demand for Cancer and Cardiac Services

The Applicant states that the Proposed Project will allow MGH to address inpatient capacity constraints resulting from a growing demand for cancer and cardiac services. The Massachusetts General Hospital Cancer Center (Cancer Center) and the Corrigan Minehan Heart Center (Heart Center) provide a significant amount of inpatient care in M/S beds. In addition to providing patient care, both centers conduct research and clinical trials to diagnose, treat, and prevent illness.

The Applicant states age is a risk factor for the top two most prevalent diseases in Massachusetts - cancer and cardiovascular disease (CVD), and that demand for cancer and cardiac care will be accelerated by an aging population. The correlation of steadily increasing rates for cancer with increasing age demonstrates the relevance age plays in considering cancer risk factors.[h,i] The median age of cancer diagnosis is 66, and a quarter of new cancer diagnoses occur in individuals ages 65 to 74.[j,20] Similarly, age is a dominant risk factor for CVD.[k] Age can increase risk of damaged or narrowed arteries and a weakened or thickened heart muscle. Increases in CVD cases due to aging and population growth, will result in more heart attack, stroke, and heart failure hospitalizations.[l,m] The age 65 and older age cohort represented 27% of MGH's existing patient population in FY19.

The Applicant points to data showing that the age 65 and older age cohort is expected to account for 20% of the US population by 2030.[n,o] UMass Donohue population projections show that by year 2035, the age 65 and older population will comprise 23% of the state's population, up from 13.8% in 2010.[p] Over this time period, the prevalence of CVD is projected to increase

[18] Transferred patients to MGH include MGB and non-MGB patients, as well as from in-state and out-of-state residents. MGH has transfer agreements with 97 hospitals.
[19] Lost transfers: instances of clinically accepted patients who were ultimately not admitted to MGH, resulting in a lost transfer.
[20] Median Age at diagnosis by type of cancer: Breast Cancer (61), Prostate Cancer (66), Colorectal cancer (68), and Lung Cancer (70).

as the population ages.[q] By 2030, 40.5% of the US population is projected to have some form of CVD.[r]

Demand for Inpatient Cardiac Beds

The Applicant asserts that the Proposed Project will address the needs of the patient population with cardiovascular disease (CVD) requiring care in inpatient beds. A sample of the procedures MGH offers is listed in Appendix III.

MGH is a regional resource providing quaternary care services to high acuity patients and advanced services for cardiac care that are not available to patients at community hospitals. For example, MGH is one of the few hospitals in the region to perform extracorporeal membrane oxygenation (ECMO).[21] And the Applicant notes it is one of the first hospitals in the country with the expertise and capability of utilizing Donation after Circulatory Death (DCD) donor hearts, donation from a deceased donor who has been declared dead on the basis of cardio-pulmonary criteria (permanent cessation of circulatory and respiratory function) rather than on neurological "brain death" criteria (permanent cessation of brain function).[s]

Inpatient care is required for cardiac patients for various reasons generally associated with higher acuity or risk such as:

- Monitoring in an inpatient unit following a procedure performed on an outpatient basis, particularly if the patient is higher risk or has comorbidities.
  - Approximately half of patients undergoing EP studies and Catheterization procedures will be hospitalized.
  - Higher-risk individuals following Angioplasty and Transcatheter aortic valve replacement (TAVR) may be hospitalized.[22]
- High-acuity patients such as those undergoing a heart or heart-lung transplant or requiring ECMO.

Demand for Inpatient Cancer Beds

The Applicant asserts that demand for cancer services is increasing due to already diagnosed patients requiring longer treatment and monitoring and anticipated new cancer diagnoses due to an aging population and advances in detection and treatment.

Advancements in treatment continue, including immunotherapies that enlist the power of a patient's immune system to attack tumors, as the fifth pillar of cancer treatment.[t] For example, CAR T-cell therapy is one of the most advanced in clinical development. CAR T-cell therapy uses the body's own immune system to help fight cancer cells. CAR T-cell therapy has to be administered in the hospital because side effects can be severe, and LOS can range from one week to one month.

[21] A specialized type of life support for the heart and lungs used to support patients with severe heart and lung failure until they recover or are able to go on long term support for transplantation.

[22] Transcatheter aortic valve replacement (TAVR) is a minimally invasive procedure to treat patients with aortic valve stenosis.

Inpatient Bed Utilization – Cancer and Cardiac

The Applicant states that need for additional inpatient capacity to support cancer and cardiac care is reflected in discharge data presented in Table 5. The Heart and Cancer Centers are the two specialties with the highest demand for inpatient care in M/S beds (the M/S row in Table 6 aggregates many different discharge codes).[23] In FY19, cancer and heart and vascular made up 39% of inpatient discharges and 34% of unique patients.

Table 5: Historical Inpatient Discharges

	FY19 Discharges	% Change (FY17-FY19)	% of Total Discharges (FY19)	Unique Patients (FY19)	% of Total Patients (FY19)
Cancer	9,675	-2.0%	23.0%	5,130	16.4%
Heart and Vascular	6,718	3.8%	16.0%	5,661	18.1%
M/S, all other (including sub-specialty)	25,585	0.1%	60.9%	20,526	65.5%
Total	41,978	0.2%	99.9%	31,317	100.0%

In response to staff inquiry about the decrease in cancer discharges, the Applicant explained that while cancer inpatient discharges decreased by 3.6% from FY16 to FY18, cancer case patient acuity[24] increased by 8.1% during that same period which results in longer LOS, as reflected by a reported 3% increase in patient days during this same period. Additionally, the overall hospital patient acuity increased by 7% during the same time period.

As discussed above, the impact of CMI on LOS and bed days further contributes to capacity constraints. Many of MGH's cardiac and cancer transfer patients suffer from major complications or comorbidities. Higher acuity contributes to longer lengths of stay: In FY19, high acuity cardiovascular patients had an average CMI of 5.97 and an average LOS of 11.51 days as compared to low acuity cardiovascular patients that had an average CMI of 1.87 and an average length of stay of 6.08 days. The association between CMI and LOS was also seen among high and low acuity cancer patients and M/S patients.

The Applicant notes a significant percentage of cardiology and cancer patients board in the ED while waiting for an inpatient bed. In FY19, 82% of admitted cardiology patients boarded in the ED for an average of 10.5 hours. During this same period, 87% of admitted oncology patients boarded in the ED for an average of 10.9 hours. The average LOS in the ED for M/S patients

[23] The Applicant states the top ten discharge diagnoses for inpatient general M/S are as follows: (1) sepsis, (2) pneumonitis, (3) alcohol dependence with withdrawal, (4) morbid (severe) obesity, (5) left knee unilateral primary osteoarthritis, (6) right knee unilateral primary osteoarthritis, (7) pneumonia, (8) acute kidney failure, (9) COPD with acute exacerbation, and (10) spinal stenosis, lumbar region with neurogenic claudication.

[24] Measured by CMI.

(excluding cardiology and oncology patients) was 13 hours. Additionally, post-procedure recovery patients, cardiac in particular, need additional recovery time, sometimes overnight and there is inadequate inpatient capacity to accommodate them.

Explanation of Plan for New Inpatient Beds

The Applicant states that the addition of new inpatient beds and an increase in designated cancer and cardiology beds will meet the shift in need from M/S to cancer and cardiac beds, address capacity constraints and allow for care to be provided under more optimal conditions and in the appropriate setting.

MGH relied on its vendor Sg2's[25] Inpatient Market Demand Forecast to create projections for inpatient discharge volume. MGB also conducted an internal system-wide bed analysis to determine the future bed needs of the system, considering acuity, service mix, geography, and other factors and matched it against current bed capacity. Data were collected by service line and utilization of resources across the continuum of care including ED boarding time, routine/M/S, and ICU beds. These data were incorporated with bed block and projection data to determine that the Proposed Project meets the needs of the Patient Panel.

The Applicant provided projections of inpatient discharges after project implementation, which are displayed below in Table 6. MGH anticipates that new patient volume will primarily originate from its existing service area as the population ages and as new technologies and treatment options lead to referrals for the type of advanced care available in an AMC setting.

Table 6: Projected Inpatient Discharges

	FY25	FY26	FY27	FY28	FY29	% Change FY25-FY29
Cancer	10,839	11,056	11,277	11,390	11,504	6.1%
Heart and Vascular	7,345	7,455	7,567	7,870	8,027	9.3%
M/S, all other	23,477	23,594	23,712	23,831	23,950	2.0%
Total	41,661	42,105	42,556	43,091	43,481	4.4%

Table 7 shows percentage changes in inpatient discharges comparing FY19 data through the project implementation timeframe.

Table 7: Changes in Inpatient Discharges

	FY19	FY25	% Change FY19 -FY25	FY29	% Change FY19-FY29

[25] Sg2 is a health care research, consulting and education company that provides forecasts that are useful in understanding healthcare trends.

Cancer	9,675	10,839	12.0%	11,504	18.9%
Heart and Vascular	6,718	7,345	9.3%	8,027	19.5%
M/S, all other	25,585	23,477	-8.2%	23,950	-6.4%
Total	41,978	41,661	-0.8%	43,481	3.6%

Over time, the Applicant is projecting further decrease in M/S inpatient discharges. Its projection model, which included a variety of assumptions to address shifts in care, found several factors to account for this shift. Among them are:

- Improved care coordination.
- Improved health outcomes resulting in fewer inpatient M/S admissions.
- Further migration of surgical care across all service lines from inpatient to outpatient settings due to advancements in technology and reimbursement structures.
- Lower acuity medical cases are being redirected to community sites and to innovative programs such as the Home Hospital,[26] to care for patients in appropriate, lower cost settings.
- Some inpatient cancer and cardiac care will shift from inpatient to high acuity outpatient but will remain at the MGH Main Campus to allow for access to a higher-level care when needed for higher risk patients. Other lower-level outpatient procedures and patients will migrate to MGB's outpatient and freestanding sites, if clinically appropriate. There will be some cases for which technological and clinical supports will only be available in the inpatient setting in the AMC environment.

Table 8 below shows the current and projected number of licensed and operational inpatient beds. MGH has 24 licensed beds that are currently out of service and not staffed. These beds are still included in the facility's licensed bed count and can be returned to service. MGH will be moving these beds into operation with implementation of the Proposed Project. Subsequently, the Proposed Project's new 94 licensed beds plus the 24 reactivated beds will yield 118 new operational beds of which 78 will be M/S and 40 will be ICU.

Table 8: Current and Projected Licensed and Operational M/S and ICU Inpatient Beds

Bed Type	Current Licensed and Operational beds	Current Licensed Beds to be Reactivated	New Licensed Beds	Total Future Beds (Licensed and Operational)	% Increase (Current # of Licensed Beds / Total # of New Licensed Beds)
M/S	765	24	54	843	7.1%
ICU/CCU/SICU	101	0	40	141	39.6%

[26] Mass General Home Hospital has been operational since April 2017. MGH Home Hospital Program Hospital at Home Programs offer an alternative to traditional inpatient hospitalization for patients who are sick enough to be admitted to the hospital, but stable enough to be treated at home. The program allows patients to avoid inpatient care which alleviates overcrowding in the ED and improves inpatient bed capacity.

Coronary Care (ICU)	16	0	0	16	0.0%
Burn Unit (ICU)	7	0	0	7	0.0%
Total (M/S + ICU)*	**889**	**24**	**94**	**1,007**	**10.6%**

*Excludes OB, Pedi, Psych, and NICU

The Applicant relied on FY19 data to represent current conditions, the last full year of data prior to submission of the DoN application. As of FY19, MGH was operating at 92% capacity. Cancer and cardiac patients accounted for 43% of patient days and experienced longer LOS than all other M/S patients. While 110 beds were dedicated to cancer in FY19, 216 beds were utilized for cancer, which means these patients were receiving care outside of these designated units. The design of the new building with adjacent floors and more efficient management of occupancy will lead to better cohorting and allow for flexibility to utilize beds when needed for cardiac and cancer patients.

To demonstrate impact of the Proposed Project on bed need, the Applicant provided Tables 9 and 10, a comparison of existing utilization at MGH (FY19) with utilization after project implementation (FY29). In addition to the projections, the tables include many of the elements that contribute to bed demand, including discharges, LOS and occupancy rate. Table 9 reflects the Applicant's projected allocation of beds for FY29.

Table 9: MGH Utilization (FY19)

	FY19						
	Discharges (# of Inpatients Released from the Hospital During the Time Period Examined)	**Patient Days (Sum of the Number of Days Spent in the Hospital for Each Inpatient who was Discharged During the Time Period Examined)**	**LOS (Patient Days/ Discharges)**	**Designated Beds (# of Beds that are Designated to Each Service Line (Cancer, Cardiac, and M/S))**	**Utilized Beds (Beds that Were Actually Used, by Service Line (Cardiac, Cancer, and M/S))**	**Beds Days Available (Utilized Beds x 365)**	**Utilized Bed Occupancy (Patient Days / Bed Days Available)**
Cancer	**9,675**	**66,902**	**6.91**	**110**	**216**	**78,840**	85%
Routine		62,385		110	202	**73,730**	85%
ICU		4,517			14	**5,110**	88%
Cardiac	**6,718**	**48,971**	**7.29**	**157**	**157**	**57,305**	85%
Routine		38,027		123	123	**44,895**	85%
ICU		10,944		34	34	**12,410**	88%
All other Med/Surg	**25,585**	**154,615**	**6.04**	**622**	**516**	**188,340**	82%
Routine		132,207		532	440	**160,600**	82%
*ICU**		22,408		90	76	**27,740**	81%
Total Med/Surg	**41,586**	**270,487**	**6.50**	**889**	**889**	**324,485**	83%
Routine		232,619		765	765	279,225	83%
**ICU*		37,868		124	124	45,260	84%
*Includes 7 Burn Bed licenses/patients that are not Med/Surg							

Bedded OP Days		13,443					
Total Days		283,931			889	324,485	88%

Table 10: MGH Projected Utilization (FY29)

	FY29 (Projected)[27]					
	Discharges (# of Inpatients Released from the Hospital During the Time Period Examined)	**Patient Days (Sum of the Number of Days Spent in the Hospital for Each Inpatient who was Discharged During the Time Period Examined)**	**LOS (Patient Days/ Discharges)**	**Designated Beds (# of Beds that are Designated to Each Service Line (Cancer, Cardiac, and M/S))**	**Bed Days Available (Utilized Beds x 365).**	**Occupancy (Patient Days/ Bed Days Available)**
Cancer	11,504	79,550	**6.91**	**219**	**79,935**	**100%[28]**
Routine		74,180		201	73,365	101%
ICU		5,370		18	6,570	82%
Cardiac	8,027	58,519	**7.29**	**226**	**82,490**	**71%**
Routine		45,442		180	65,700	69%
ICU		13,077		46	16,790	78%
All other Med/Surg	23,950	149,922	**6.26**	**562**	**205,130**	**73%**
Routine		127,108		462	168,630	75%
*ICU**		22,814		100	36,500	63%
Total Med/Surg	43,481	287,991	**6.62**	**1,007**	**367,555**	**78%**
Routine		246,729		843	307,695	80%
**ICU*		41,262		164	59,860	69%
*Includes 7 Burn Bed licenses/patients that are not M/S						
Bedded OP Days		13,443				
Total Days		301,434		1,007	367,555	82%

To further demonstrate impact of the Proposed Project on bed need, the Applicant reviewed growth at MGH over a 10-year period. The Applicant focused on FY29 because it will closely resemble a full year of operation of the facility after project implementation. This is shown in Table 11 below. The Applicant states that the data reflect increases in the areas (patient days, discharges, average LOS) which are the focus of the application (cancer and cardiac) and decreases in other areas (All other, M/S and outpatient). The Applicant also notes that annual growth rates (discharge and patient days) for cancer and cardiac is just under 2% per year over the 10-year period.

[27] Per the Applicant, the year being used for projection is only Year 2 after the building opens and the goal is not to be at maximum occupancy targets (85% routine, 75% ICU) at this point

[28] There is overlap between cancer and M/S use of beds (e.g. a cancer patient who contracts pneumonia). Therefore, some cancer patients will use M/S beds, resulting in a higher occupancy rate on the Cancer bed line but an artificially lower number in the M/S line. The cancer patients' days are still attributed to the cancer beds, even if they are in a M/S bed.

Table 11: 10-Year Growth Impact

	Total Discharge Growth FY29 vs. FY19	Discharge Average Growth per Year	Total Patient Days Growth	Patient Days Average Growth Per Year FY29 vs. FY19
Cancer	17.0%	**1.7%**	18.9%	**1.9%**
Routine			18.9%	**1.9%**
ICU			18.9%	**1.9%**
Cardiac	15.0%	**1.5%**	19.5%	**1.9%**
Routine			19.5%	**1.9%**
ICU			19.5%	**1.9%**
All other M/S	-6.0%	**-0.6%**	-3.0%	**-0.3%**
Routine			-3.9%	**-0.4%**
*ICU**			1.8%	**0.2%**
Total M/S	5%	**0.5%**	6.5%	**0.6%**
Routine			6.1%	**0.6%**
**ICU*			9.0%	**0.9%**
*Includes 7 Burn Bed licenses/patients that are not M/S				

II. Need for Increased Access to CT, MRI, PET/CT, and PET/MR Imaging.

The Applicant states that the MGH Main Campus has limited imaging capacity, and additional imaging units are needed to address the increasing demand for imaging services among the Patient Panel that will occur due to an aging population, increasing disease incidence, and treatment advances. The Applicant states that imaging is a necessary component of cancer and cardiovascular disease (CVD) detection and diagnosis, as well as on-going monitoring. Consequently, need for imaging to diagnose, treat, and monitor cardiac and cancer patients is expected to increase as incidence of cancer and CVD increases. The new imaging units will primarily serve patients in the new building and support co-located cancer and cardiac care and high acuity patients. The existing imaging units will support the departments remaining at the Main Campus.

The sections below will detail the Applicant's stated need for each type of imaging modality and how the Proposed Project will impact it, through an examination of historical and projected utilization of existing imaging units as well as current and projected wait times. When determining how many imaging units were needed to support Patient Panel need for imaging services, the Applicant considered historical utilization, growth projections for services that utilize MRI as a diagnostic imaging tool, backlog (unmet demand), and imaging throughput (efficiency). The Applicant notes that imaging demand is creating a backlog and increasing wait times, delaying treatment and diagnosis, which has been shown to adversely impact health outcomes and patient satisfaction.

Through this project the Applicant proposes to add the following imaging capacity:

a. Computer Tomography (CT) (2 Units)
b. Magnetic Resonance Imaging (MRI) (2 Units)
c. Positron emission tomography–computed tomography (PET/CT) (2 Units)
d. Positron emission tomography–magnetic resonance imaging (PET/MR) (1 Unit)

Table 12 below lists current imaging units at MGH, type of utilization, and hours of operation. Each row represents one imaging unit.

Table 12: Hours of Operation for Existing Imaging Units at MGH.

CT	**HOURS OF OPERATION**
ED	24 X 7
ED	24 X 7
Cardiac/Inpatient	M-F 8a-12a SS 8a-8p
Inpatient	M-F 8a-12a SS 8a-8p
Inpatient/Outpatient	M-F 8a-12a SS 8a-8p
Inpatient/Outpatient	M-F 8a-12a SS 8a-8p
Outpatient	M-F 8a-8p
Outpatient	M-F 8a-8p
Inpatient	M-F 8a-12a SS 8a-8p
OR (IntraOperative)	M-F 8a-12a
Portable	M-F 8a-5p
PET/CT	**HOURS OF OPERATION**
Inpatient/Outpatient	M-F 7a-5p
Inpatient/Outpatient	M-F 7a-5p
MRI	**HOURS OF OPERATIONS**
ED	24 X 7
Inpatient/Outpatient/ER	M-F 7a-11:30p SS 7a-730p
Inpatient/Outpatient/ER	M-F 7a-11:30p SS 7a-730p
Inpatient/Outpatient/ER	M-F 7a-11:30p SS 7a-730p
Outpatient	M-F 7a-11:30p SS 7a-730p
Outpatient	M-F 7a-11:30p SS 7a-1130p
Outpatient	M-F 6a-11:30p
Outpatient	M-F 6a-630p
Outpatient	M-F 6a-630p
OR (IntraOperative)	M-F 8a-4:30p

Table 13 shows existing number of imaging units at MGH by type of imaging modality, proposed new units, and new totals if the Proposed Project is approved. Table 14 also presents wait times for existing imaging units and projected reductions in wait times if the Proposed Project is approved.

Table 13: Proposed Imaging Units and Wait Times

	Existing Units at MGH	Proposed (in New Building)	Total at MGH if Project Approved	Current Wait Time	Projected Wait Time	Percent Change Wait Time (Current vs. Projected)
CT	14	2	16	23 days (outpatient)	10 days	-56.5%
MRI	10	2	12	40 days (outpatient)	7 days	-82.5%
PET/CT	2	2	4	6 days (outpatient)	As soon as possible after order received; wait time of fourteen days may be medically acceptable	Not enough information to calculate
PET/MR	1	1	2	New imaging modality not yet in service.	N/A	N/A

a. CT

CT is a well-established, non-invasive imaging technique that is employed in a variety of clinical and research settings for diagnosis, planning or guiding interventional or therapeutic procedures, and for monitoring the effectiveness of therapy. The Applicant states that two new CT units are needed to address growing demand for CT services and increasing wait times among the Patient Panel. The new CTs will primarily support cancer and cardiac patients presenting to the new building.

The Applicant provided historical CT volume and unique patients for FY17-19 shown in Table 14. CT scan volume increased by 17.6% during this period and the number of unique patients increased by 9.5%.

Table 14: Historical CT Scan Volume and Unique Patients

	FY17[29]	FY18	FY19	% Change FY17-FY19
Unique Patients	45,518	46,150	49,841	9.5%
CT Scan Volume	90,227	97,873	106,087	17.6%

[29] The Applicant states FY17 data volumes and patient counts are approximate.

Table 15 shows the Applicant's projections for a ~20% increase in CT scan volume after project implementation.

Table 15: Projected CT Scan Volume

	FY25	FY26	FY27	FY28	FY29	% Change FY25-FY29
Projected CT Scan Volume	144,716	150,652	152,743	162,906	172,972	19.5%

The Applicant states that due to capacity constraints, the current wait time for outpatient CT imaging services at the Main Campus is 23 days. The Applicant expects that the addition of two CT units will reduce wait times for outpatients at the Main Campus from 23 days to 10 days.[30]

b. MRI

MRI is a well-established, non-invasive imaging modality that is used to visualize internal, and anatomical structures, without the use of ionizing radiation. The Applicant states that MRI is the highest-demand imaging modality at MGH, and that patients who require an MRI experience the longest wait times as compared to CT and PET/CT. The Applicant states that two new MRI units are needed to address growing demand for MRI services among the Patient Panel which the Applicant attributes to growth for services that utilize MRI as a diagnostic imaging tool, backlog (unmet demand), and imaging throughput (efficiency).

The Applicant provided historical MRI volume and unique patients for FY17-19. This is shown in Table 16 below.[31] MRI scan volume increased by 14.8% during this period and the number of unique patients increased by 14.9%.

Table 16: MRI Scan Volume and Unique Patients

	FY17	FY18	FY19	% Change FY17-FY19
Unique Patients	24,435	26,732	28,061	14.8%
MRI Scan Volume	39,237	42,486	45,080	14.9%

The Applicant projects a ~8.5% increase in MRI scan volume after project implementation. This is shown in Table 17 below.

[30] The Applicant states that generally, the CT exam should be completed as soon as possible after the order is received. However, depending on clinical acuity and medical necessity as determined by referring clinician and radiologist judgement, a wait time of seven days is the outer limit of clinically acceptable.

[31] The top indicators for MRI of cancer and cardiac inpatients include abnormal prior CT imaging, liver cancer, abdominal mass, pancreatic cyst, glioblastoma, melanoma, metastatic cancer, brain/CNS neoplasm, spinal cord tumor assessment, cardiomyopathy, congenital heart disease, and aortic disease.

Table 17: Projected MRI Scan Volume

	FY25	FY26	FY27	FY28	FY29	% Change FY25-FY29
Projected MRI Scan Volume	48,390	49,451	50,460	51,450	52,496	8.5%

The Applicant states that oncology and cardiac volume together made up a total of 18.3% of MRI scan volume in FY20.

The Applicant states that due to current capacity constraints, the wait time for MRI at the MGH Main Campus is 40 days and the wait for an outpatient cardiac MRI is three weeks.[32] The Applicant expects overall wait times for MRI to decrease to seven days after project implementation.

The Applicant also provided data on MRI access for inpatients and emergency patients. As shown in Table 18, since 2018, 10% or fewer ED patients have accessed an MRI within 2 hours and over 20% have waited 6 hours or more. Wait time for MRI among inpatients is grouped differently, but notably, for all three years >30% of inpatients have waited over 24 hours for an MRI.

Table 18: Wait Time for MRI for Inpatients and Emergency Patients

ED Turn Around Time	**2018**		**2019**		**2020**	
	Volume	%	Volume	%	Volume	%
0 - 2 Hours	755	10.4%	881	10.0%	590	8.7%
2 - 4 Hours	2,890	39.6%	3,021	34.5%	2,403	35.5%
4 - 6 Hours	2,137	29.3%	2,549	29.1%	1,916	28.3%
6+ Hours	1,510	20.7%	2,316	26.4%	1,864	27.5%
Total	**7,292**	**100.0%**	**8,767**	**100.0%**	**6,773**	**100.0%**
Inpatient Turnaround Time	**2018**		**2019**		**2020**	
0-6 hours	3,311	30.5%	2,371	25.4%	3,246	28.6%
6-12 hours	2,132	19.7%	1,812	19.4%	2,577	22.7%
12-18 hours	723	6.7%	721	7.7%	855	7.5%
18-24 hours	895	8.3%	768	8.2%	860	7.6%
Greater than 24 hours	3,780	34.9%	3,678	39.3%	3,824	33.7%
Total	**10,841**	**100.0%**	**9350**	**100.0%**	**11,362**	**100.0%**

c. PET/CT

[32] Wait time is calculated based on time to next 3rd available appointment. Generally, the "third next available" appointment is used rather than the "next available" appointment since it is a more sensitive reflection of true appointment availability.

Combined PET/CT is a dual-modality diagnostic imaging technology. Clinicians use PET/CT imaging to better understand disease processes and to make treatment decisions. The Applicant states that an additional PET/CT unit is needed to address growing demand for PET/CT services among the Patient Panel.

The Applicant provided historical PET/CT volume and unique patients for FY17-19.[33] This is shown in Table 19 below.

Table 19: Historical PET/CT Scan Volume and Unique Patients

	FY17	FY18	FY19	% Change FY17-FY19
Unique Patients	3,134	3,088	3,624	15.6%
PET/CT Scan Volume	9,621	10,311	12,343	28.3%

The Applicant states that prostate cancer screening accounts for a large portion of PET/CT scan volume, and that demand for PET/CT is increasing because, at any given time there are approximately 82,950 prostate cancer patients in Massachusetts. According to new modeling data, approximately 54% of these patients benefit from prostate-specific membrane antigen (PSMA) based imaging (i.e., 44,793 patients annually). Patients require PET/CT imaging for staging, re-staging, and peptide receptor radionuclide therapy (PRRT) planning for PSMA therapies, which may lead to multiple scans per patient.

The PSMA routine, annual exam was approved by Medicare in January 2022. The Applicant states that routine scans are performed at MGH (Main Campus and Chelsea) and the goal is for them to be available at all MGB facilities with PET/CTs. The Applicant notes that while MGH will not be the exclusive location for PSMA scans for the MGB Patient Panel, not all (MGB) community providers have PET capabilities and staff to operate.

The Applicant states that the current wait time for PET/CT imaging services is six days at the Main Campus and this is projected to increase as demand for PET/CT services increases.[34,35]

The Applicant projects a 7.6% increase in PET/CT scan volume after project implementation. This is shown in Table 20 below.

Table 20: Projected PET/CT Scan Volume

[33] The Applicant states that the most common indicators for PET/CT by inpatients at MGH include the following: lymphoma, lung mass, lung cancer, fever of unknown origin, esophageal cancer, gastric cancer, weakness, and cancer surveillance.
[34] Wait time is calculated based on time to next 3rd available appointment. Generally, the "third next available" appointment is used rather than the "next available" appointment since it is a more sensitive reflection of true appointment availability.
[35] The Applicant states that MGH does not currently track wait times for inpatients but estimates that it is generally 3 days.

	FY25	FY26	FY27	FY28	FY29	% Change FY25-FY29
Projected PET/CT Scan Volume	20,327	20,758	21,216	21,547	21,875	7.6%

PET/MR

PET/MR combines two established technologies into one new integrated unit, allowing for two different types of scans to be performed in sequence while the patient is in the same position. The Applicant states that the PET/MR unit in the Proposed Project is needed to provide access for the inpatient cancer and cardiac services in the new facility.

The Applicant received approval for the first PET/MR in Massachusetts in 2019. The unit was approved for part-time clinical PET/MR use, part-time research (to advance the potential use of the technology), and part-time MR only use (for MRI imaging to address excess demand for MRI at MGH). The unit is currently in the process of being implemented and not yet operational. Implementation was delayed due to the COVID-19 pandemic. Therefore, there is no historical volume data. The Applicant's timeline is to license the unit and begin scanning patients in the summer of 2023. The Applicant states the PET/MR unit in the Proposed Project is needed to provide this service to the inpatient cancer and cardiac services in the new facility. Currently, patients are receiving conventional imaging from CT, MRI, or PET/CT but PET/MRI has been shown to be valuable for diagnosis, staging, and treatment, and shows findings not seen on PET/CT.

Table 21 shows the Applicant's projections of PET/MR scans based on forecasted volume of patients within the Patient Panel that will have cancers for which PET/MR has historically been utilized. The Applicant is projecting a 66.7% increase in scan volume after project implementation. In terms of wait times for PET/MR, the Applicant states that as a new imaging modality, not only at MGH, but nationally, an optimal wait time has not been established.

Table 21: Projected PET/MR Scans

	FY25	FY26	FY27	FY28	FY29	% Change FY25-FY29
Annual PET/MR scans	468	546	624	702	780	66.7%

If the Proposed Project is approved, the second PET/MR will be operational in 2025 when the new facility opens. The Proposed Project's PET/MR will be located in the new facility and provide co-located service access for inpatients, while the previously approved, part-time PET/MR unit will serve the rest of the MGH campus.

Staff notes that in recent years the Applicant has applied for and received several Notices of DoN for DoN-required imaging equipment, including equipment that will be located in Waltham

and Somerville. Staff asked the Applicant about the impact of previously approved imaging equipment on the Proposed Project. The Applicant states that the proposed new imaging units in this Application will primarily serve patients in the new building to support co-located care for high-acuity patients and therefore previously approved applications by MGB for DoN-required equipment acquisitions will not impact access for inpatients.

III. Need for Co-located Cancer and Cardiac Services

The Applicant states that the new facility will focus on furthering care coordination for cancer and cardiovascular patients by relocating most of the MGH's Cancer Center and Heart Center facilities services into distinct areas and allowing for co-located services.[36] The new building will house the following cancer services: Outpatient visits, Inpatient Services, Infusion Therapy, Urgent Care, Ancillary Services including lab and imaging, and Supportive Care Services. The Applicant asserts that improving and expanding clinical services for cancer and cardiac patients requires a facility that can provide high acuity services and support extensive interdisciplinary care teams. The information provided below details the Applicant's stated need for expanding and co-locating cancer and cardiac services.

a. Fragmented Care

Currently, cardiac and cancer services are scattered in buildings across MGH's campus, requiring outpatients to schedule multiple appointments with multiple providers across various times (and days) and campus locations. For both cancer and cardiac services, co-location will optimize efficient operations, enhance patient experience, care efficiencies, and facilitate team collaboration. Co-locating most services in one facility will enable patients to coordinate appointments and minimize repeat visits. For both cancer and cardiac services, co-location will optimize efficient operations, enhancing patient experience, care efficiencies, and facilitate team collaboration.

b. Increasing Demand for Cancer and Cardiac Services

<u>Cancer Center</u>

To address future demand for oncological exams and infusion therapy, the Proposed Project will:

- Relocate 79 infusion bays and add 21 infusion bays totaling 100 infusion bays, inclusive of 9 multipurpose, short stay infusion bays.
- Relocate 120 of the existing 123 oncology rooms, a reduction of three, that will operate at expanded hours.

[36] The Applicant states the Cancer Center's radiation therapy and surgical services will not be relocated. Radiation therapy is not moving to the new facility due to the substantial costs that would be incurred due to the equipment transportation and the construction of the required infrastructure to support these services. Oncology surgery is currently performed in the hospital's mixed use ORs and this will continue. The current spaces occupied by the cancer and cardiac services represents 6% of the Hospital's total outpatient space. This space will not be available until after projection implementation sometime around 2027 to 2030 and the Applicant has not yet determined the future use for the space. The Applicant notes that future consideration for use of the space will take into consideration clinical needs for decompression, including dense outpatient space that are not well configured for social distancing and may also consider consolidating currently leased spaces into this owned building to produce costs savings.

The Applicant states that MGH is experiencing increased demand for oncology services, which is reflected in historical data showing a steady growth in volume and number of unique patients for outpatient visits, and infusion therapy from FY17-FY19. This is shown in Tables 22 and 23 below.

Table 22: Cancer Center Outpatient Exam Volume[37]

		FY17	FY18	FY19	FY20 Q1	% Change FY17-FY19
New	Unique Patients	12,884	12,840	13,407	3,578	4.1%
New	Visits	16,920	17,010	18,103	4,579	7.0%
Established[38]	Unique Patients	32,155	32,442	33,688	16,335	4.8%
Established	Visits	134,409	134,576	141,262	38,379	5.1%
Total (unique patients)	New + Established	45,039	45,282	47,095	19,913	4.6%
Total (visits)	New + Established	151,329	151,586	159,365	42,958	5.3%

Table 23: Infusion Therapy Volume

	FY17	FY18	FY19	FY20 Q1	% Change FY17-19
Unique Patients	4,793	4,982	5,071	2,533	5.8%
Visits	40,468	42,660	43,877	11,322	8.4%

Through this Proposed Project, the Applicant will consolidate its existing infusion bays which are currently spread out among multiple sites and will all be moving over to the new tower.

The Applicant states that the 21 additional bays in the new cancer center will be allocated between the expansion of Oncology Urgent Care and Symptom Management and Phase I /Complex Phase II Clinical Research as follows:

- Oncology Urgent Care and Symptom Management (Additional Six (6) Bays, 24x7)

37 The Applicant states outpatient encounters are inclusive of visits requiring a visit with a physician, nurse, or advanced practice nurse and data for outpatient encounters excludes visits where an exam room was unnecessary.

38 Established patients are those who have previously accessed services, versus new patients accessing services for the first time

In the new Infusion Center, the Hospital will have a total of 15 urgent care bays that will operate 24x7. The additional six (6) bays will allow patients to receive symptom management such as receiving IV hydration outside of the ED without being admitted as an inpatient. This provides patients more convenient access to needed services and frees up capacity in the ED for patients requiring urgent or emergent care in a unit now open 7am to 6pm. The Applicant states that comprehensive cancer centers around the country have been developing Urgent Care and Symptom Management Centers as a way to avert ED admissions and provide access to specialized oncology care.[39] The Applicant states further that MGH's large CAR T-cell and Blood and Marrow Transplantation Program expect to heavily utilize this setting as these new treatments evolve to require less inpatient time and move towards earlier discharge or patients who can be cared for in the outpatient setting as needed following discharge but may require access to urgent care services for symptom management.

- Phase 1 Clinical Research (Additional 15 Bays)
  The Cancer Center currently has a 10-bed Phase 1 Clinical Research Center (the Termeer Center). MGH's Phase 1 clinical research is part of the Cancer Center's core missions and MGH's Phase 1 clinical trials can only be conducted at the Main Campus due to the need for access to its clinical research infrastructure, as well as the inpatient units and ICU. The new center will operate 7 am-11 pm and will have a total of 25 Phase 1 Clinical Research infusion bays, which is an expansion of 15 bays.

Table 24 provides assumptions and plans for outpatient infusion bays.

Table 24: MGH Future Outpatient Infusion Bays

Current Cancer Infusion Areas	Current Bays	Operational Assumptions in New Location	FY28 Plan (Bays)	Comments
Infusion (General Infusion (Yawkey) and Observation	60	10 peak hrs./open 16hr, 70% to 75% Utilization	60	Flexible and Modular
Infusion (Observation)	9	10 peak hrs./open 24x7, 70% to 75% Utilization	15	Will be used to avoid ER
Infusion (Phase I Clinical Research/Complex Phase I)	10	10 peak hrs./open 16hr, 65% to 70% Utilization	25	Flexible and Modular
Total Cancer Center Infusion Rooms	**79**		**100**	

[39] The Applicant states that the MGH Cancer Center conducted several site visits including Hopkins and Yale, where these models have been implemented with successful outcomes.

Over the past decade, MGH developed a distributed network and has infusion capacity at several sites that it directly owns or manages, including in the cities/towns of Waltham and Danvers, and at Newton-Wellesley Hospital and Emerson Hospital. The Applicant states that the focus of these community sites is for the provision of standard cancer infusion, primarily for less complex breast, GI, prostate, gynecological, and thoracic cancers along with some hematologic malignancies. Tertiary care and quaternary care are the focus of the Boston/Main Campus given the access to the clinical research and advanced multi-disciplinary care.

The Applicant states that historical infusion center volume information along with projections based on population and other factors from Sg2 were used to determine the number of infusion bays needed to address increasing demand for services. Table 25 shows historical and projected cancer infusion visits data the Applicant provided through FY28.

In response to staff inquiry concerning the siting of infusion bays at the MGH Main Campus (versus other locations within the MGB system), the Applicant stated that MGH needs additional capacity in its core departments, inpatient units, and research facilities to support Phase I clinical trials and the participating patients requiring sub-specialized, multidisciplinary care. The Applicant states that MGH is working closely with its networks to ensure that routine cancer care is seen in the community and that the more complex care requiring Phase 1 clinical trials, complex regimens such as theranostics, should be performed at MGH.

Table 25: Cancer Infusion Visits Historical and Projected

Cancer Infusion Areas	FY18	FY23	FY28	% Growth FY18-23	% Growth FY18-28
Infusion (Yawkey)	38,968	49,291	57,141	26.5%	46.6%
Infusion (Observation)	6,000	7,688	9,600	28.1%	60.0%
Infusion (Phase I Clinical Research/Complex Phase I)	3,575	4,755	6,256	33.0%	75.0%
Total Cancer Center Infusion Visits[40]	**48,543**	**61,734**	**72,997**	**27.2%**	**50.4%**

Regarding oncology exams, the Applicant asserts that the Proposed Project will allow MGH to meet current and future demand for oncology services. The Applicant provided volume projections for outpatient exams to show changing demand over time with project implementation. The Applicant projects a 11.6% increase in outpatient exam volume as shown in Table 26.

Table 26: Five-year Volume Projections for Outpatient Exam

[40] The Applicant notes that different infusion volume totals for FY18 are due to timing and different queries used to calculate FY18 actual volume: application total was calculated using completed visits in MGH's using departments on the Main Campus as recorded in the EHR and total volume in the Table was based on infusion cases performed at MGH's Main Campus based on outpatient billing data regardless of where on the MGH campus the service was performed.

	FY25	FY26	FY27	FY28	FY29	% Change FY25-FY29
Outpatient Exams	188,063	193,132	198,352	203,728	209,840	11.6%

The Applicant asserts that the Cancer Center as described above will meet its Patient Panel needs.

Heart Center

The Proposed Project includes 23 cardiac operating rooms, including six (6) conventional operating rooms dedicated to cardiology and 17 hybrid multipurpose ORs, and 3 new procedure rooms dedicated to cardiology, for a total of 26 new and relocated ORs and procedure rooms. To support these ORs and procedure rooms, the project includes increasing the number of perioperative bays from 18 (which will move to the relocated cardiac center) to 50.

Previously, 9 rooms in which cardiac catheterization and EP were performed were not categorized as ORs, rather as procedure rooms, but a 2018 change in the Facilities Guideline Institute (FGI) guidelines[41] and subsequent adoption by DPH plan review has led to these rooms now being categorized as hybrid ORs, and they are categorized as such in Table 27 below, which shows the changes in cardiac services.

Table 27: Existing and Proposed Cardiac Services

	Current # at Current Location	# Moving to Proposed Site	# New at Proposed Site (additional)	Total at MGH Boston campus after project implemented (All located at Proposed Site)
Conventional OR's	5	5	1	6
Hybrid multipurpose ORs	9	9	8	17
Procedure Rooms	0	0	3	3
Perioperative Bays	18	18	50	68

To further support its assertation that the need for cardiovascular services is increasing with increasing incidence of CVD associated with an aging population, the Applicant provided historical procedure volume and unique patients for FY17-19 shown in Table 28. These data demonstrate steady growth in volume and unique patients during which total procedures increased by 5.8%, and unique patients increased by 12.5%.

Table 28: Historical Cardiovascular Procedure Volume – Unique Patients

[41] https://www.fgiguidelines.org/wp-content/uploads/2019/10/FGI_determining_appropriate_room_type_191024.pdf

	FY17	FY18	FY19	Percent Change FY17-FY19
Unique Patients	26,344	27,835	29,651	12.6%
Total Procedures	39,779	41,810	42,092	5.8%

The Applicant provided average wait times for emergency patients, outpatients, Post-Procedure Recovery (PPR) patients and inpatients, which are shown in Table 29 below. PPR patients are those who need a catheterization due to an abnormal stress test and/or symptoms of coronary artery disease and can be seen in the office by an MGH cardiologist but require that an inpatient bed be available before the procedure can begin (despite the goal of same-day discharge). The requirement of an available inpatient bed can delay the procedure and contribute to wait times.

Table 29: Historical Cardiovascular Procedure Wait Times in Days

	FY17				FY19				FY20			
Setting	ED	OP	PRR	IP	ED	OP	PRR	IP	ED	OP	PRR	IP
Catheterization Lab	0.1	11.5	14.9	1.4	0.2	16.9	23.9	1.4	0.1	12.5	31.4	1.9
EP Lab	2.0	12.6	40.7	1.5	0.2	11.4	42.2	1.6	0.2	9.3	58.2	1.3

The Applicant is projecting a 3.4% increase in procedural volume from FY25 to FY29, after project implementation. This is shown in Table 30 below. Without the proposed planned capacity, the Applicant expects that wait times would only increase for patients.

Table 30: Five-year projections for Cardiovascular Procedures

	FY25	FY26	FY27	FY28	FY29	% Change FY25-FY19
Total Procedures	43,195	43,408	43,627	44,183	44,651	3.4%

The Applicant asserts that the Heart Center as described above will meet its Patient Panel needs.

The Applicant notes that both the Facilities Guideline Institute (FGI) and DPH Plan Review require at least two bays per OR and Class 2-3 Imaging room. Currently the Heart Center has 14 operating rooms and 18 perioperative bays, resulting in a ratio of 1.2:1 perioperative bays to operating rooms which the Applicant states is too few to support the operating rooms. The Proposed Project will result in a total of 68 bays that will support the 23 cardiac operating rooms and 3 procedure rooms, resulting in a ratio of 2.6:1 to be in line with FGI and DPH requirements. This is shown in Table 31 below.

Table 31: Operating to Procedure Room Ratios

	# of Operating Rooms	# of Procedure Rooms	# of Bays	Ratio
Existing	14	0	18	1.2:1
Proposed	23	3	68	2.6:1

The Applicant states that in addition to increasing the number of bays and expanding capacity for patient care, the new perioperative bays in the Proposed Project will be three-sided, which will improve patient privacy and satisfaction and aid in post-operative recovery.[42] The care model to be implemented will provide for the use of all perioperative bays for all procedural spaces (procedure rooms and ORs), and some bays will be used for Short Stay or Extended Recovery patients that require a longer period of post-operative care but do not need inpatient care.

IV. Regional Resource

The Applicant states that MGH is a regional resource with the capability to provide high-level, specialized care for critical patients that most other hospitals in the area are not equipped to handle.

- MGH has more than 2,500 trauma admissions annually.
- MGB states that MGH is the only transplant center in the region to offer adult transplantation for every organ. And, as discussed previously, MGH is one of the only hospitals in the country that has performed heart transplants using DCD donor hearts.
- As one of the few hospitals in the region to offer ECMO it receives transfers of ECMO patients from other hospitals in the region.

V. Disaster Preparedness

The Applicant asserts that the increasing frequency of weather-related emergencies due to climate change will impact access to care for patients and that an adaptable infrastructure is needed. MGH's core buildings were not designed to withstand the extreme environmental conditions that are being forecasted. In addition, the Hospitals' existing infrastructure cannot be modified to withstand environmental disaster. The Applicant asserts that modern, transformative facilities are required at MGH to adapt to provide support in cases, including unique medical needs that may arise from natural disasters or disease outbreaks.

The Applicant asserts that the Proposed Project was designed with disaster preparedness in mind and includes:

- Infrastructure to withstand a disaster and to accommodate an influx of patients in such an event.
- Ability to ensure self-sustainability of the Hospital during environmental disaster with features providing building resiliency, flood resistance, and adaptability in mass casualty and pandemic events.

[42] The 2018 FGI Guidelines, and also previous editions, allow the pre-operative and post-operative patient care stations to be either open bays defined by privacy curtains or cubicles enclosed on three sides with a privacy curtain on the fourth side, or enclosed rooms with doors.

- Enhanced flexibility to convert from general M/S care to ICU in the event of a major disaster. The PACU design enables conversion to ICU beds allowing for necessary equipment including ventilators and afforded patient privacy.

Analysis – Factor 1a

Inpatient Beds

Staff find that based on the historical and projected data provided by the Applicant, it has demonstrated need to redesign inpatient capacity, increase imaging capacity, and expand and co-locate cancer and cardiac services in order to address Patient Panel need for these services. Staff finds that there is support for replacing double-bedded rooms with private rooms, including:

- Private rooms have become the standard of care. FGI requires that newly constructed patient rooms be single-bed rooms.
- Current inpatient capacity constraints disrupt patient flow and access to care, and result in longer LOS and wait times across different areas of care, which in turn, limits access for additional patients. An immediate benefit to building single-bedded inpatient rooms will be the ability to assign any patient to a room, this avoiding bed block issues now faced such as consideration of infectious disease (currently three of the Applicant's stated top four reasons for blocked beds), gender, and age when assigning patients to double rooms.
- Private rooms have been shown to directly impact patient health by preventing the spread of infection including prevention of cross-infection from unrecognized carriers of pathogens; reducing medical errors (reduced likelihood of misidentifying patients in single rooms); increasing patient privacy, safety and comfort; and providing easier access for staff and improving the ability to accommodate family members, who have been shown to have a positive impact on outcomes when involved in patient care.[u,v,w]

As more care shifts to outpatient settings, the inpatient setting is more concentrated with higher acuity patients, some with comorbidities, who require complex and specialized care and stay in the hospital for longer periods of time. Cancer and cardiac incidence and prevalence are expected to increase with an increasing aging population and MGB anticipates the need for additional capacity (94 beds) to meet this increase. The Applicant asserts that eliminating the number of blocked beds will alleviate current ED boarding and throughput which will lead to a reduction in delayed care or people leaving the ED without care.

The Applicant provided 10-year projections to demonstrate how the Proposed Project will address Patient Panel need. This analysis compared a variety of hospital measures under existing conditions (FY19) and after project implementation (FY29) to demonstrate how the Proposed Project's additional inpatient capacity will be sufficient to meet the needs of M/S, cancer and cardiac patients, while relieving wait times in the ED and PACU. The Applicant describes the general outlines of the proprietary methodology used by Sg2, on which it relied to assess Patient Panel need and to project healthcare utilization which is not replicable by staff.

To better understand how the Applicant determined the number of beds needed, Staff requested an explanation, with data, of how the Applicant calculated the need for 94 inpatient beds including factors, data, source and methodology used in the calculation and how bed blocks, ED wait times for M/S boarding and volume/utilization patterns were factored into the number of additional beds needed. The Applicant replied that it collected data by service line and utilization of resources across the continuum of care including ED boarding time, routine and ICU bed stays. These data were incorporated with blocked beds and projection data to determine that the Proposed Project meets needs including space, financial, operational and patient care. The Applicant added that the addition of new specialty beds was based on demand for current dedicated specialty beds. No data were provided for staff to review or analyze.

Staff find that the need for single rooms and a building to house them has been demonstrated. Staff note that three of the top four reasons for blocked beds relate to infectious disease and should be alleviated with the implementation of single rooms. It is unknown what the level of resolution of ED boarding and throughput issues the introduction of 388 single-bedded rooms (that replace the 388 beds in double-bedded rooms), plus 24 reactivated single beds (for a total of 412 single-bedded rooms) was calculated to be. Without that information, staff cannot find clear and convincing need has been demonstrated by the Applicant for the 94 additional beds. Accordingly, staff recommend that the new tower and the transfer and license of 388 beds to single rooms be approved (and the Applicant is able to reactivate the 24 currently inactive beds), but that the 94 additional M/S beds be disapproved. The Applicant may subsequently submit a Substantial Amendment to demonstrate need for the additional 94 beds including data as described in the conditions section (Condition 2).

Imaging

Staff reviewed current and proposed imaging volume to understand how the addition of new imaging technology may support Patient Panel need for such services. A comparison of historical and projected year over year growth of imaging volume is presented in Table 32 below. Staff find that projected year to year growth trajectory in imaging volume is consistent with or below historical growth trends based on historical utilization trends that were provided for fiscal years ’17, ’18 and ’19. The Applicant states the Proposed Project factors existing wait times and growth in considering need for new imaging units.

Table 32: Year to Year Percentage Growth in Scan Volume by Modality

	Historical			Projected			
	FY17-FY18	FY18-FY19		FY25-FY26	FY26-FY27	FY27-FY28	FY28-FY29
CT Scan Volume	8.5%	8.4%		4.1%	1.4%	6.7%	6.2%
MRI Scan Volume	8.3%	6.1%		2.2%	2.0%	2.0%	2.0%
PET/CT Scan Volume	7.2%	19.7%		2.1%	2.2%	1.6%	1.5%

There is no comparator for PET/MR because MGH does not currently offer that modality.

Table 33: Year to Year Percentage Growth in PET/MR Scan Volume

	Projected			
	FY25-FY26	**FY26-FY27**	**FY27-FY28**	**FY28-FY29**
PET/MR Scan Volume	16.7%	14.3%	12.5%	11.1%

The Applicant states the units included in the Proposed Project are for higher acuity patients, primarily cancer and cardiac patients who will be served at the new tower. The Applicant has imaging available throughout its system, including several outpatient locations, which it asserts will not meet the needs of these patients. The Applicant also states that approved but not yet implemented imaging capacity at Waltham and three MRI units in Somerville will decrease outpatient wait times.

Given that existing capacity constraints (as demonstrated by current wait times) will be partially addressed with these units, future review of MGB's imaging capacity must include a review of all the units available to its Patient Panel. Therefore, Staff recommend approval of the MRI, CT and PET/CT units but note it is appropriate to require MGB, through a condition in this Notice of DoN, to report on the wait times at Waltham and Somerville as well as at the MGH main campus (Condition 4).

Regarding the requested PET/MR unit, the Applicant asserts that the existing unimplemented PET/MR unit at MGH will be used for research, PET/MR clinical scans and MRI overflow, while the Proposed Project's PET/MR will be in the new facility and provide co-located service access for inpatients. However, no data regarding unit capacity is available for review. While the benefits of co-location of services is acknowledged, the number of scans projected for FY25 is 468 and is expected to increase to 780 by FY29. Staff note that not all cancer and cardiac services will be moved to the new centers, as the Applicant has weighed the cost of doing so against the benefits and determined not all services need to be in one location. Weighing the cost of a new unit for a low number of scans (780 annually in 10 years) when the capacity of an already approved, yet to be implemented unit is unknown, Staff do not find proven benefit in an additional PET/MR unit at this time and recommend disapproval for this imaging unit. The Applicant may subsequently submit a Substantial Amendment to demonstrate need for the additional PET/MR, including data as described in the conditions section (Condition 3).

In order to ensure the Proposed Project addresses Patient Panel need for additional imaging capacity as the Project is implemented, as a Condition of approval, once the new building is complete and the proposed imaging units are operational, the Applicant will be required to report on utilization of the imaging units approved in this DoN, including wait times and acuity of patients who receive imaging at this site. Additionally, the capacity and wait times of these new units will be factored into consideration of future DoN Applications from the Applicant for additional imaging units. The full text of the condition is listed in the Conditions section of this report.

Cardiac Center

As noted above, the 65 and older cohort, which is more likely to require cardiology services, is expected to grow to account for ~10 percentage points more of the state's population than it currently does (from 13.8 to 23%). Additionally, as noted above, it is projected that within 10 years, 40.5% of the US population will have some form of CVD.

Table 34 presents both historical and projected year to year change in cardiovascular procedures. Projected volume is below FY17 to FY18 growth but within 1 percentage point above or below FY18 to FY19 growth. Staff calculate 6% projected growth in cardiovascular procedures between FY19 and FY29.

Table 34: Year to Year Change Cardiovascular Procedure Volume

	Historical			Projected			
	FY17-FY18	FY18-FY19		FY25-FY26	FY26-FY27	FY27-FY28	FY28-FY29
Cardiovascular Procedure Volume	5.1%	0.7%		0.5%	0.5%	1.3%	1.1%

The implementation of a combination of conventional ORs (increasing from five (5) to six (6)) and hybrid, multipurpose rooms in the cardiac center (increasing from 9 to 17) will allow more flexibility in treating patients. The same room can be used for non-invasive procedures or more invasive procedures, allowing for more flexibility in scheduling or responding to urgent needs.

The number of perioperative bays in the Proposed Project is intended to bring the cardiac center within the FGI guidelines for appropriate ratios of support bays to procedure rooms. The need for these bays has been demonstrated and the exam rooms will not be discussed further in this report.

To ensure the Proposed Project addresses Patient Panel need for additional cardiac ORs and procedure rooms as the Project is implemented, staff recommends a condition of reporting on the metrics as described in Condition 4 in the Condition section of the report.

Cancer Center

Outpatient Exam Rooms

Staff reviewed current and proposed outpatient exam volume to understand how the addition of capacity responds to Patient Panel need.

A comparison of historical and projected year to year growth of outpatient exam volume is presented in Table 35. Staff find that for outpatient exam volume, year to year changes in projected volume after project implementation exceed historical utilization for FY17-FY18 but not for FY18-FY19. Staff note that the projections shown are in alignment with current trends.

Table 35: Year to Year Change Outpatient Exam Volume

	Historical			Projected			
	FY17-FY18	FY18-FY19		FY25-FY26	FY26-FY27	FY27-FY28	FY28-FY29
Outpatient Exam Volume	0.2%	5.1%		2.7%	2.7%	2.7%	3.0%

Infusion Bays

The Applicant provided an analysis of historical and projected infusion volume based on infusion locations in the current building that will be re-located as described above. This is presented in Table 36.

Table 36: Existing and Projected Infusion Visits

Cancer Infusion Areas	FY18	FY23	FY28	% Growth FY18-23	% Growth FY18-28
Infusion (Yawkey)	38,968	49,291	57,141	26.5%	46.6%
Infusion (Observation)	6,000	7,688	9,600	28.1%	60.0%
Infusion (Phase I Clinical Research/Complex Phase I)	3,575	4,755	6,256	33.0%	75.0%
Total Cancer Center Infusion Visits	**48,543**	**61,734**	**72,997**	**27.2%**	**50.4%**

The projections show a 50% increase in total cancer center infusion visits from FY18 to FY28, which is in line with the Applicant's assertions of an increasing need for cancer services, due in part to a growing aging population. The Applicant notes the growth in infusion therapy as a result of higher utilization of infusion therapy, as cancer is more frequently becoming chronic diseases that can be controlled and managed for long periods of time with infusion therapy. Additionally, immunotherapy is a new area of cancer treatment that can be administered via infusion. As noted above, the Applicant expects cancer rates to grown as the population ages. The additional 6 bays intended for observation will allow patients to receive symptom management, such as receiving IV hydration outside of the ED without being admitted as an inpatient, and also freeing up capacity in the ED. The observation bays will be open 24 hours, seven days a week, an expansion from the current 10 hours per day the current observation bays are available.

Regarding the need for Phase I Clinical Research/Complex Phase I Infusion bays, the Applicant proposes to increase the number of bays from 10 to 25. The historical data provided on utilization of infusion bays includes clinical research infusion. MGH is well known as a center for clinical research trials. Utilization of infusion for clinical research is projected to increase at much higher rates that for the other bays (Table 36 shows a 75% increase in use of these bays by FY29).

Co-located Care

The Applicant has demonstrated need to co-locate cancer and cardiac services. For the cancer center this includes oncology exam rooms and infusion bays, and for the cardiac center, cardiac procedure and operating rooms, as well as available imaging equipment in the tower. Co-locating these services in the new building will reduce the number of places patients will need to visit to obtain their care and will allow for collaboration among providers to improve quality of care and outcomes. This will also support the provision of effective, team-based care, reduce fragmentation, and improve care coordination for the Patient Panel, so that patients are able to receive most of their care in one location.

With the conditions listed in this section, and the exception of the PET/MR imaging unit, the Proposed Project meets Factor 1a.

Factor 1: b) Public health value, improved health outcomes and quality of life; assurances of health equity

In this section staff will assess if the Proposed Project adds measurable public health value in terms of improved health outcomes and quality of life for the Applicant's existing Patient Panel, while providing reasonable assurances of health equity.

Public Health Value: Improved Outcomes and Quality of Life

The Applicant asserts that the Proposed Project will improve health outcomes and quality of life of the Patient Panel through improvements to the physical plant, including an increase in private rooms; co-location and team-based care which allows for integrated, multidisciplinary care, better communication between providers, and more effective care in matching patient needs; through advanced imaging to support diagnosis, treatment, and monitoring; and through disaster preparedness. These elements have been described above in Factor 1a.

Additionally, the Applicant asserts the Proposed Project will improve health outcomes and quality of life of the Patient Panel through the new building's age-friendly design, and through existing population health management (PHM) strategies.

- **Age-friendly design of the building**[43]**:** The Applicant states that the new building will be designed to ensure that care is aligned with the unique needs of the aging population and that the design strategies for an aging population will assist patients with a full range of abilities. A list of features is described in Appendix IV.
- **Population Health Management (PHM) Strategies**: The Applicant states that every clinical Department at MGH has a population health management (PHM) strategy and

[43] Becoming Age-friendly means reliable practice of four evidence-based interventions, known as the 4Ms: asking what matters to older adults; making sure medications are helpful, not harmful to patients; attending to mentation, including delirium, depression, and dementia; and ensuring mobility so older adults can maintain their function.
Institute for Healthcare Improvement Announces New Age-Friendly Action Community.
https://www.businesswire.com/news/home/20200129005105/en/Institute-for-Healthcare-Improvement-Announces-New-Age-Friendly-Action Community#:~:text=Becoming%20Age%2Dfriendly%20means%20reliable,mobility%20so%20older%20adults%20can

that the strategies are aimed at improving quality, efficiency, and patient experience and can directly or indirectly impact patients at multiple points on their care continuum (including inpatient and outpatient). These programs will continue to be offered to patients through the Proposed Project to improve quality outcomes and patient experience. The Applicant notes that PHM strategies typically are implemented in the physician office setting and are not directly utilized by the Hospital. The Applicant affirms its commitment to using PHM strategies, the efficacy of which are tracked at the MGB level. A list of the PHM strategies described by the Applicant can be found in Appendix V.

The Applicant suggests that many of the changes stemming from the Proposed Project, which were discussed in detail above, will lead to improved outcomes and quality of life for the Applicant's Patient Panel.

- **Private Rooms:** The Applicant has noted that private rooms provide more patient-centered care, reduce the spread of infection, and will reduce ED boarding and improve flow of patients from surgery to inpatient rooms.
- **Imaging:** The Applicant asserts that advanced imaging can improve quality of life by providing more accurate information to facilitate appropriate treatment and reduce unnecessary treatment; increased imaging units will also lead to reduced wait times and improved patient experience. In addition, the Applicant states that physician orders for MRI use are placed through the electronic health record, which utilizes a clinical decision support mechanism to guide practitioners in determining the most appropriate exam based on the patient's medical history and indication.
- **Co-located Services:** The Applicant claims that co-locating cancer and cardiac services will improve the quality of care for patients, reducing fragmented care and increasing patient satisfaction, as detailed in the previous section, improve quality of care and patient experience and will decrease inefficiencies resulting from fragmented resources.

Analysis: Improved Outcomes and Quality of Life

The Applicant proposed specific outcome and process measures to track the impact of the Proposed Project, which staff have reviewed, and which will become a part of the reporting requirements. The measures are listed in Appendix I.

Staff find that the various elements of the Proposed Project will contribute to improved health outcomes, quality of life, and patient satisfaction.

Public Health Value: Health Equity

The Applicant affirms that it ensures health equity to all patients and the Proposed Project will not impact accessibility of MGH's services for "poor, medically indigent, and/or Medicaid eligible individuals." Hospitals in the MGB system, including MGH, participate in the American

Hospital Association's #123Equity Pledge Campaign,[44] which strives "to eliminate health and health care disparities that exist for racially, ethnically and culturally diverse individuals and identifies area for leaders to focus on to ensure high-quality, equitable care for everyone." Through the Campaign, MGH will ensure patients have equal access to benefits resulting from the Proposed Project. The Applicant also began to participate in the United Against Racism initiative[45] as the leaderships' commitment to eliminate impact of racism on MGB's patients and employees.

Additionally, the Applicant states that they have adopted the Culturally and Linguistically Appropriate Service (CLAS) standards for all practice sites, including MGH. The Applicant has committed to adopting these standards through six areas, pursuant to DPH's guide to CLAS, many of which relate to the #123Equity Pledge Campaign. These include Foster Cultural Competence, Build Community Partnerships, Collect and Share Diversity Data, Benchmark – Plan & Evaluate, Reflect and Respect Diversity, and Ensure Language Access.

The Applicant states that over the past decade, MGH has launched a variety of diversity initiatives to address healthcare disparities, increase the percentage of employees from underrepresented groups, build trust among individuals of diverse backgrounds and evaluate the Hospital's progress. The Applicant described ongoing initiatives at MGH that both meet the goals of the #123Equity Pledge Campaign and support compliance with the CLAS standards. Additional information on each of the initiatives can be found in the DoN Application and Responses to DoN Questions on the DoN website.

Cultural competence

The Applicant states that MGH has arrangements to provide ongoing education and training in culturally and linguistically appropriate areas for staff at all levels and across all disciplines.[46] MGH has a Language Access and Assistive Services Plan in place, which the Applicant states embodies all of the CLAS Standards. Training on interpreter services policies is part of orientation for all MGH staff. Staff within each of the areas of the Proposed Project receive training on how and what modality to use to access language assistance for patients with Limited English Proficiency (LEP) and Deaf and hard-of-hearing (DHH) individuals. Clinicians receive training by interpreter services on best practices for accessing language assistance services.

Additional detail on MGH's programs related to cultural competence can be found in Appendix VI.

[44] The Campaign requires hospital leaders to accelerate progress in the following areas: (1) Increasing the collection and use of race, ethnicity, language preference and other socio-demographic data; (2) Increasing cultural competency training; (3) increasing diversity in leadership and governance; and (4) Improving and strengthening community partnerships.
[45] Initiative includes a roadmap for achieving equality within the Applicant's system and eliminating racism and oppression faced by the Applicant's patients, communities, and staff. Key elements of the United Against Racism plan focuses on addressing racism through the lens of patient care, leadership and culture across the Applicant's system, and through partnerships with the communities, and organizations within the community, that Applicant serves.
[46] In FY19, MGH completed 196,098 interpreter services requests using face-to-face, video remote, and telephonic sessions, and completed 100% of those requests. The top five interpreter service requests by language were Spanish, Portuguese-Brazilian, Arabic, Chinese-Mandarin, and Haitian-Creole.

As a standard condition of approval of the Proposed Project, as set out in DoN regulation 105 CMR 100.310, all Determination of Need Holders must provide a plan for approval by the Office of Health Equity for the development and improvement of language access and assistive services provided to individuals with disabilities, non-English speaking, Limited English Proficiency (LEP), and American Sign Language (ASL) patients.

Analysis: Health Equity

Staff finds that the Applicant's planned language access services are appropriate for patients receiving care at MGH. Further, the Applicant has described population health and community-based health equity initiatives that seek to support health equity among the Patient Panel. The Applicant has appropriately outlined at a high level a case for improved health outcomes and has provided reasonable assurances of health equity for the Patient Panel.

Factor 1: c) Efficiency, Continuity of Care, Coordination of Care

Consolidation of care

Currently, cardiac and cancer services are scattered in buildings across MGH's campus, requiring outpatients to schedule multiple appointments with multiple providers across various times (and days) and campus locations, as noted in Factor 1a. For both cancer and cardiac services, co-location will optimize efficient operations, enhance patient experience, care efficiencies, and facilitate team collaboration. Co-locating most services in one facility will enable patients to coordinate appointments and minimize repeat visits. For both cancer and cardiac services, co-location will optimize efficient operations, enhancing patient experience, care efficiencies, and facilitate team collaboration.

Care Linkages

The Applicant states that MGH staff will continue to provide patients with linkages to services that will help to prevent unnecessary readmission, ensure appropriate care management, and provide patients with the resources for improving underlying issues that impact health. The Applicant noted the following integrated care programs/strategies which it states have a particular focus to ensure continuity of care, improved health outcomes, and quality of life:

- Existing formal processes for linking patients with PCPs and community providers.
- Case management/social work support to ensure patients have access to resources to address SDOH needs. The Applicant notes that navigators and social workers are available to assist patients with transportation needs.
- Population Health Management (PHM) strategies aimed at improving patient experience and outcomes, including its Home Hospital and MGB Mobile Observation Unit (MOU) programs offering alternatives to ED care for patients.
- Cardiac Care Linkages – Communication with patients' primary care and community-based physicians before, during and after care is provided at MGH. Communication includes dissemination of patient care plans, diagnostic and procedure reports, and diagnostic images for studies performed at MGH. The Heart Center has a dedicated staff

of nurse and physician ambassadors who manage relationships with community providers. Heart disease prevention programming includes dedicated cardiovascular clinics, dedicated Cardiovascular Disease Prevention Center, and the Cardiovascular Genetics Program, which are discussed further in Factor 2.

- Cancer Care Linkages – MGH established an equity and diversity program that is focused on vulnerable patient populations that frequently have higher mortality cancer rates, such as minority, low-income and immigrant populations. A nurse navigator collaborates with staff and referring institutions to support patients through the cancer treatment continuum and provide linkages to necessary social supports. The navigator also works to increase patient participation in clinical trials through education programs for support staff, patient navigators, and physicians, and partners with MGH-specific programs and initiatives to address barriers and improve education for cancer care. The Applicant states that the Cancer Center offers a robust set of wrap-around services to patients.[47]
- The Applicant points to co-location of services and increased capacity as ways to increase efficiency.

The Applicant states that MGH offers services to ensure treatment is in line with a patient's health goals, and end-of-life care. MGH offers Geriatrics and Palliative Care consultative services at this time and will continue to do so following project implementation. These services are always available and coordinated with each patient's primary care as needed to ensure time-appropriate delivery.

- Continuum Project is a hospital-wide education and training initiative to facilitate "Serious Illness Conversations" for patients and their families developed by MGH in 2015. Through the Continuum Project, MGH clinicians are trained to have conversations with their patients so that patients have both the information needed to direct their treatment and care planning and the opportunity to engage with their care team in a meaningful way.
- While MGH notes that some inpatient beds will be utilized by patients for hospital-based hospice, it refers appropriate patients for home hospice program as well as the opportunity to enroll in GIP (inpatient hospice at MGH) when needed. Hospice referrals may also be made by the primary medical team with support for coordination of care and eligibility from Inpatient Case Management.
- Geriatric assessment requires a multidisciplinary process to build a coordinated plan aimed at maximizing health and quality of life. The assessment considers that the goals of care of a patient may change as they age. A multidisciplinary team including case management can support this as well as they can provide a link between the hospital-based care team and the patient's community care team. The Applicant states that the connection with care providers who are longitudinally familiar with a patient can strongly support individualizing care to be in line with the patient's care goals.

[47] Services include the following: Social Work and Psych-Oncology, Integrative Therapy, Parenting at a Challenging Time (PACT), Nutrition, Tobacco Cessation, Healing Garden, Illuminations, and Mind-Body Resiliency. A full description of these services can be found on page 50 of the DoN application narrative.

Analysis

Staff find that the Proposed Project contains elements that have been shown to improve care coordination and make care more efficient. As healthcare has become more complex, patients receive care across multiple providers in multiple different settings, which can result in care fragmentation. This is especially important for patients managing chronic conditions with multiple needs including behavioral, mental health, and social.[x] The number of patients in the US with chronic conditions is increasing, and both cancer and cardiovascular disease are often chronic. Fragmented care is associated with worse quality, lower patient satisfaction and higher costs.[y,z] Poor coordination during cancer treatment is associated with medical errors, poor symptom control, less comprehensive supportive care, and increased utilization and costs.[aa] One study found that greater fragmentation of care was associated with higher utilization of radiology and other diagnostic tests.[bb] Another study of Medicare beneficiaries with diabetes mellitus, chronic obstructive pulmonary disease, and heart failure, found a consistent association between higher levels of care continuity, lower rates of utilization of hospital and ED visits, lower complication rates, and lower episode costs.[cc]

Coordinated care has been associated with better patient experiences, depression management, cost management, and lower utilization of services.[dd] Co-locating both cancer and cardiac care will further integrate these services and improve care coordination by reducing the number of trips as well as the number of buildings patients need to visit to receive their care. Additionally, private rooms have been found to foster improved communication and coordination among clinical staff. [ee] Making care more coordinated and efficient can also reduce the time between diagnosis and treatment, which has been shown to improve outcomes, quality of life and patient satisfaction.

Factor 1: d) Consultation

The Applicant has provided evidence of consultation, both prior to and after the Filing Date, with all government agencies that have licensure, certification, or other regulatory oversight, which has been done and will not be addressed further in this report.

Factor 1: e) Evidence of Sound Community Engagement through the Patient Panel

The Department's Guideline for community engagement defines "community" as the Patient Panel and requires that, at minimum, the Applicant must "consult" with groups representative of the Applicant's Patient Panel. Regulations state that efforts in such consultation should consist of "engaging community coalitions statistically representative of the Patient Panel."

The Applicant community and Patient Panel focuses broadly across many neighborhood and community stakeholders of the service area. The Applicant held focus group meetings with these community organizations:

1. Beacon Hill Civic Association
2. Downtown North Association
3. West End Civic Association

4. Boston Preservation Alliance
5. Esplanade Riverfront Pavilion Project
6. Massachusetts Eye and Ear Infirmary
7. Museum of African American History
8. Old West Church
9. Wyndham Hotel, Liberty Hotel
10. West End Community Center and Museum

The Applicant also involved the inner community of MGB by hosting 'idea-generating' workshops among PFAC Public Space Committee, MGH Community Advisory Board, and patient and family advisory council (PFAC) representatives from MGH Heart and Vascular Center, Cancer Center, General Center, and the staff group. A total of 43 PFAC members participated in the development of the Proposed Project: 20 from the General PFAC; 11 from the Cardiac PFAC; and 12 from the Cancer PFAC. Each of the PFACs is representative of the Hospital's patients and community but demographic information is not collected and therefore not available. The resulting ideas were presented back to the workshop group as contributing factors for the design and implementation of the Proposed Project. Staff did not identify any active translation where these stakeholder-generated ideas were directly utilized for the blueprint for the Proposed Project.

The Applicant states that those consulted are from the same community from which the Patient Panel originates and thus represents the facility's Patient Panel. The Applicant engaged with the downtown neighborhood associations, business stakeholders, nearby educational centers, and major cultural areas for their service area.

Analysis

Staff reviewed the information on the Applicant's community engagement and finds that the Applicant has met the required community engagement standard for Consult in the planning phase of the Proposed Project.

Factor 1: f) Competition on price, total medical expenses (TME), costs and other measures of health care spending

The Applicant outlined the following cost savings that will result from implementation of the Proposed Project:

Timely Care

- Introduction of single beds to reduce or eliminate bed blocks allows for improved care as patients are moved out of the ED to the inpatient setting more quickly, and more efficient throughput is expected to reduce LOS with subsequent cost savings.
- Expanding cancer and cardiovascular services will lead to expedited treatment for patients, reducing rates of ED visits and inefficient use of patients' and physicians' time. This will reduce burden of disease on the patient and avoid costs associated with later diagnoses.
- Reduction of wait times in the ED decreases cost of care.

Care Efficiencies

- Co-location of services improves communication among practitioners, ensuring continuity of care and improved outcomes.
- Co-location of services reduces duplication of services.
- Implementation of more efficient staffing patterns once the cardiac and cancer services are co-located.
- Improvement of throughput in locations across the MGH campus.
- Reduction in ED visits and hospitalizations through more efficient and effective care.

Single-bedded rooms

- Operating costs are reduced mainly through decrease in LOS resulting from reduced spread of infection, patient falls, and medication errors. The Applicant states that MGH anticipates that it will be able to track decreases in healthcare spending and cost savings as demonstrated through care being provided in the right location, including reducing LOS and boarding in the ED and PACU.

The Applicant further stated that it has recently implemented the following strategic initiatives and efforts to continue to reduce costs that have positively impacted the Massachusetts healthcare market:

- **MGB Enterprise Data and Digital Health Initiative**: Five-year strategic digital health initiative to improve patient experience, boost digital innovation, and transform clinical care across the system's hospitals reducing both operation costs and the cost of care, leading to reductions in overall provider costs, thereby reducing TME, and ultimately total healthcare expenditures.
- **Community Hospital Transfer Program**: System-wide initiative to provide care for patients in the most appropriate setting. ED physicians at AMCs can directly admit medically appropriate patients to one of the system's community hospitals. This reduces both operation costs and the cost of care, leading to reductions in overall provider costs, thereby reducing TME, and ultimately total healthcare expenditures.
- **Population Health Management (PHM) Programming:** The Applicant states that its PHM programs are used throughout the system, providing patient-centric, holistic care, creating efficiencies, and achieving improved quality outcomes. Efficiencies lead to a reduced cost of care, as many of these initiatives seek to eliminate unnecessary hospitalizations, ED visits, and specialty visits. The Applicant states that its integrated care management program (iCMP) has been formally evaluated for cost and utilization impact upon Medicare, Medicaid, and commercial health plan patients.[48] The Applicant noted that some of the PHM programs are relatively new, and their implementation has been inhibited by the pandemic.

[48] Adult Medicare iCMP: Patients enrolled 24 months, $125 average per member per month (pmpm); Adult Commercial iCMP: Patients enrolled for over 12 months, 24% reduction in TME; Adult Medicaid iCMP: Patients enrolled for over 12 months, 12% reduction in TME.

Analysis

The following cost benefits of the elements of the Proposed Project have been established in the literature:

- Private rooms reduce risk of hospital-acquired infections (HAIs) which are the most common complication of medical care in the United States. HAIs cause medical complications and increase morbidity, mortality, and healthcare costs equating to ~ $9.8 billion per year.[49,ff]
- Studies are finding that the high building costs of private rooms can be offset by the financial benefits of keeping patients safer from infection.[gg]
- Care fragmentation is associated with increased costs of care.[hh]
- Increasing access to care and reducing delays in diagnosis and treatment can reduce costs.

Cost containment on a statewide level is impacted through pricing, which is a function of what providers charge payers, what payers agree to pay, and which services are rendered. While payment contracts between providers and Medicare and Medicaid are relatively transparent, those between individual providers and commercial payers are confidential. As a result, staff cannot assess how MGH's contracts with payers, which may incentivize more or less utilization of services, are structured.

Staff compared statewide relative price (S-RP), a publicly available measure produced by CHIA, across AMCs in Massachusetts to better understand price differences between these providers, noting that CHIA states that S-RP should only be used for directional purposes.[50] This information is presented in Table 37 below.

Table 37: 2019 Statewide Relative Price (S-RP)[ii]

Academic Medical Center	S-RP
Beth Israel Deaconess Medical Center	1.052
Tufts Medical Center	1.082
UMass Memorial Medical Center	1.090
Boston Medical Center	1.284
Massachusetts General Hospital	1.382
Brigham and Women's Hospital	1.389

[49] Researchers reviewed published data from 1998 through April 2013 and adjusted the costs for inflation in 2012 dollars.
[50] S-RP blends relative price across payers using payer payment distributions. Since relative price is calculated within each payer, a blending of relative prices will not account for absolute price differences across payers. For this reason, it is not advisable to use S-RP to understand absolute price differences between one provider and another. S-RP should only be used for directional purposes.

The S-RP for MGH is second only to that of Brigham and Women's Hospital (BWH), the other AMC in the MGB system.

Staff asked the Applicant how it determined that MGH was the appropriate setting in the system for the location of the Proposed Project as compared to a lower cost setting in its system. The Applicant's response focused on its intent through the Proposed Project to improve care for cancer and cardiac patients and that these patients require a facility capable of providing high acuity services as well as extensive interdisciplinary care teams, and MGH is the best equipped setting to provide those services. In addition, cancer and cardiac patients require services that need to be administered in the inpatient setting, that can result in side effects that require hospitalization, or that can require an inpatient stay because of a patient's acuity, further supporting need to expand these services at the Main Campus. MGH anticipates that new patient volume will primarily originate from its existing service area as the population ages and regional, national, and international referrals for advanced care that is available in an AMC setting.

In evaluating this factor, staff notes that single-bed rooms are industry standard, and the bed blocks resulting from the current double-bedded rooms have significant downstream impacts for patients in various locations throughout the hospital, including the PACU and the ED. Among these are the cancer and cardiac patients on whom the Proposed Project focuses provision of more coordinated specialty care. Additionally, patients in community hospital settings requiring care at MGH are unable to transfer due to the lack of capacity. Recognizing that MGH provides high case mix tertiary and quaternary care, as well as the benefits of coordinated care for cardiac and patients, while there is anticipated cost increase, staff find that with conditions, the benefits of the Proposed Project, on balance, help it to meet Factor 1, with conditions.

SUMMARY for FACTOR 1

As a result of information provided by the Applicant and additional analysis, staff finds that with two notable exceptions (the additional 94 M/S beds and the PET/MR recommended for disapproval), and with the conditions detailed below and in the Conditions section, the Applicant has demonstrated that the Proposed Project has met Factor 1(a-f).

The Applicant proposed specific outcome and process measures to track the impact of the Proposed Project (found in Appendix I) which staff have reviewed, and which will become a part of the reporting requirements, in addition to the measures suggested by staff and described below. Reporting must include a description of numerator and denominators, where applicable.

To ensure the Proposed Project is addressing Patient Panel needs as described in the Application, staff recommends a condition that requires MGB to report specific data related to imaging, cardiovascular services, oncology services, and inpatient. Within these, there are specific referral indicators which would result in referral to the Public Health Council (PHC) for review to determine whether MGB is in violation of one or more of the conditions and thus out of compliance with the terms of this Notice of DoN.

Factor 2: Cost containment, Improved Public Health Outcomes and Delivery System Transformation

Cost Containment

Within the Determination of Need regulation 105 CMR 100.000, two factors, in part, require the Department to consider cost containment as it pertains to the Proposed Project: Factor 2 which requires a project meaningfully contribute to the Commonwealth's cost containment goals and Factor 4 as relates to any independent cost analysis required for a given project to demonstrate whether the project is consistent with the Commonwealth's cost containment goals. Because both factors require the Department to analyze the Proposed Project's impact on health care cost containment in the Commonwealth, the Department has considered the cost containment-specific portions of both Factor 2 and Factor 4 in this section.

Discussion in the Application

In response to this factor, the Applicant states that the state's goals for cost containment include providing lower-cost care alternatives without sacrificing quality of care and remaining below the state's healthcare cost growth benchmark, a key provision of the state's health care cost containment law, Chapter 224 of the Acts of 2012, which directs the HPC and CHIA to monitor health care spending growth relative to a benchmark.

MGB goes on to cite the system's approach to population health management and other strategic initiatives to provide lower cost care to patients; these efforts were previously described as related to Factor 1.b and Factor 1.f. As relates to MGB's cost containment efforts generally, the Applicant describes its Community Hospital Transfer Program (CHTP). The Applicant indicates this program leverages capacity within the MGB system to provide care to lower acuity patients in a lower-cost setting and ensures high-acuity patients have access to tertiary and quaternary services to meet their care needs. With regard to MGH, the CHTP allows patients in the MGH ED appropriate for community hospital care to be directly admitted to Newton Wellesley Hospital, and in turn ensures MGH is able to provide care to those patients in need of tertiary and quaternary services.

While not specific to cost containment, the Applicant states that the Proposed Project will enable MGH to provide tertiary and quaternary care unavailable elsewhere in the region. MGB contends the centralized Centers of Excellence "fully support cost containment and the most effective and patient-responsive use of resources" through efficiencies and lower administrative costs gained as a result of co-locating services, adding capacity, improved staffing, and provision of team-based care.

Independent Cost Analysis (ICA) and Comments in Response to the ICA

Pursuant to G.L. c. 111 § 25C(h) and to support the Department's understanding of the Proposed Project's impact on the Commonwealth's cost containment goals, an independent cost-analysis (ICA) was required.

The ICA was prepared by Charles River Associates (CRA), who concluded that the Proposed Project is consistent with the Commonwealth's cost containment goals because, while CRA does predict the Proposed Project will result in an increase in health care expenditures, it contends this increase is minimal at 0.2%, adding that the "economics literature predicts that allowing capacity-constrained providers such as MGH to expand puts downward pressure on health care prices."

CRA's analysis shows increased patient volume across both inpatient and outpatient service lines expanded through the proposed project. Total discharges are projected to increase by 17% over the next 10 years, with somewhat lower projected increases for inpatient cancer services and higher projected increases for inpatient heart and vascular services. Demand for outpatient diagnostic imaging, cardiovascular services, and oncology visits at MGH will increase by between 10 and 21%. Table 38 shows CRA's projections for all service lines[51].

Table 38: Projected Increase in Demand by Service Line

Service Line	Projected Increase in Demand at MGH (2030 vs. 2018)
Adult Inpatient (Discharges)	17%
Cancer	14%
Heart & Vascular	22%
Other Services	16%
Outpatient CT Scans	16%
Outpatient MR Scans	10%
Outpatient PET/CT Scans	17%
Outpatient Cardiovascular Procedures	21%
Outpatient Oncology Visits	18%

CRA also concludes the project will result in increased costs for payors across both inpatient and outpatient services lines. These findings are summarized Tables 39, 40, and 41. Of note, CRA calculates that each patient switching to MGH for inpatient cancer care will cost commercial insurers 72.7% more (Table 39). The change in costs is even higher for Medicare

[51] CRA notes that its methodology for projecting demand is different from the Applicant's resulting in different rates of projected increase in demand https://www.mass.gov/doc/independent-cost-analysis-2/download

Health Plans and Managed Medicaid. Similarly, CRA estimates commercial insurers will pay 69.3% more (Table 41) for each patient switching to MGH for outpatient cancer care.

Table 39: Predicted Changes in Inpatient Spending After the MGH Inpatient Bed Expansion

	Overall Services			Cancer Services			Heart & Vascular Services	
Insurance Category	Expected Change in Costs per Switch to MGH	Expected Change in Costs per Switch Across All the Payor's Enrollees		Expected Change in Costs per Switch to MGH	Expected Change in Costs per Switch Across All the Payor's Enrollees		Expected Change in Costs per Switch to MGH	Expected Change in Costs per Switch Across All the Payor's Enrollees
Commercial	33.8%	0.16%		72.7%	2.03%		62.5%	1.27%
Medicare Health Plans	45.2%	0.20%		121.2%	2.63%		52.5%	0.83%
MassHealth Managed Care	39.1%	0.07%		82.7%	2.07%		58.5%	0.72%
MassHealth Non-Managed	1.7%	0.00%		5.0%	0.15%		2.2%	0.04%
Original Medicare	7.1%	0.03%		21.4%	0.53%		9.5%	0.16%
Overall	**14.4%**	**0.06%**		**37.8%**	**1.01%**		**19.4%**	**0.35%**

Table 40: Predicted Changes in Outpatient Spending for Imaging After the MGH Expansion

	CT Scans			MR Scans			PET/CT Scans		
Insurance Category	Volume Switching to MGH	Expected Change in Costs per Switch to MGH	Expected Change in Costs per Switch Across All the Payor's Enrollees	Volume Switching to MGH	Expected Change in Costs per Switch to MGH	Expected Change in Costs per Switch Across All the Payor's Enrollees	Volume Switching to MGH	Expected Change in Costs per Switch to MGH	Expected Change in Costs per Switch Across All the Payer's Enrollees
Commercial	25.4%	24.4%	0.3%	41.0%	23.7%	0.4%	23.1%	16.7%	1.2%
Original Medicare	41.2%	5.5%	0.0%	28.0%	18.6%	0.2%	47.2%	21.1%	1.0%
Medicare Health Plans	8.7%	-5.2%	0.0%	7.4%	0.5%	0.0%	15.8%	25.9%	1.6%
MassHealth Non-Managed	5.4%	0.0%	0.0%	3.5%	0.7%	0.0%	1.8%	2.0%	0.1%

MassHealth Managed Care	13.5%	0.3%	0.0%	15.9%	2.1%	0.0%	8.3%	3.0%	0.2%
Other	5.7%	-14.6%	-0.1%	4.2%	-6.2%	-0.1%	4.0%	4.6%	0.3%
Overall		**7.2%**	**0.1%**		**15.1%**	**0.2%**		**18.4%**	**1.1%**

Table 41: Predicted Changes in Outpatient Spending for Cardiovascular and Oncology Services After the MGH Expansion

	Cardiovascular Procedures				**Oncology Visits**		
Insurance Category	**Volume Switching to MGH**	**Expected Change in Costs per Switch to MGH**	**Expected Change in Costs per Switch Across All the Payor's Enrollees**		**Volume Switching to MGH**	**Expected Change in Costs per Switch to MGH**	**Expected Change in Costs per Switch Across All the Payor's Enrollees**
Commercial	20.3%	34.9%	0.1%		27.2%	69.3%	1.5%
Original Medicare	62.5%	0.0%	0.0%		48.2%	2.9%	0.1%
Medicare Health Plans	6.9%	1.8%	0.0%		9.9%	3.2%	0.1%
MassHealth Non-Managed	2.0%	0.0%	0.0%		2.7%	0.1%	0.0%
MassHealth Managed Care	5.1%	2.9%	0.0%		8.6%	24.5%	0.4%
Other	3.2%	12.2%	0.0%		3.4%	-11.8%	-0.2%
Overall		**7.7%**	**0.0%**			**22.3%**	**0.5%**

While the ICA acknowledges this increased spending, it ultimately concludes the project remains consistent with the Commonwealth's cost containment goals because the overall change in spending across all patients (as opposed to just those who switch to MGH) is minimal, ranging from 0.1% to 1.1% in overall increased spending across each impacted service line. As noted previously, CRA supports its conclusion by referencing economics literature suggesting expansion for a capacity-constrained provider can reduce health care prices.

However, as noted in the Health Policy Commission's (HPC) comment on the ICA, CRA's analysis fails to acknowledge the full cost implications of increased inpatient and outpatient capacity at MGH. For example, analysis performed by the HPC estimates annual increase in spending on commercial insurance between $23.7M to $40.6M annually. Additionally, the HPC's comment notes additional costs as a result of MGB's proposed ambulatory expansion which the Applicant indicates is designed to move MGB ambulatory patients into lower cost community settings. However, the HPC points out the Applicant has not proposed reducing inpatient or outpatient services at any of its existing facilities, including MGH, upon completion of the ambulatory expansion. Indeed, this Proposed Project will increase both inpatient and outpatient capacity. The HPC estimates MGB's efforts to backfill this newly vacated capacity at MGH will result in an

annual increase of $6M to 13.2M in commercial insurance spending due to inpatient volume increases with outpatient market share increases likely to drive further price increases. Taken together, the annual cost of adding volume and backfilling newly vacated capacity at MGH is estimated to be between $30.3M to $54.4M annually.

At the same time, in its comment the HPC notes that while MGB is a high-quality provider system, much of the care provided can be appropriately "provided by other high-quality Massachusetts providers." This includes care lines being expanded via the proposed project, such as imaging and medical-surgical capacity. HPC estimates increased use of MGH services would result in an approximately 0.9% to 1.7% increase in inpatient prices across the MGB system, of which approximately 0.59% to 1.29% is attributable to the Proposed Project.

In contrast with CRA's findings, the HPC notes the ICA does not account for MGB's existing market power and position as the largest health care delivery system in Massachusetts, nor does CRA acknowledge the increased bargaining leverage MGB will gain as it increases its market share. HPC indicates the Proposed Project, coupled with additional increases in inpatient capacity proposed by MGB at Brigham and Women's Faulkner Hospital (BWFH), will increase inpatient beds across MGB by 7.1% to 7.9%, and estimates this would ultimately result in a 2.7% to 3.8% increase in MGB's inpatient commercial insurer market share. If MGB's ambulatory expansion does not occur, this cost increase will be somewhat diminished.

The ICA indicates that, when considering the zip codes in MGH's service area, MGB currently has the highest market share for each service line impacted by the Proposed Project. As shown in Table 42, its market share will increase across each service line upon implementation of the Proposed Project while other providers' shares will decrease.

Table 42: MGB's Current and Projected Market Share by Location and Service

MGH Service Line	MGB Share Before Proposed Project	MGB's Share After Proposed Project (Patients from All Providers)	Largest Decrease in Other Systems' Share After Proposed Project
Adult Inpatient Discharges	34%	35.1% (+1.1%)	BILH (-0.21%)
Outpatient CT	35.2%	36.8% (+1.6%)	BILH (-0.5%)
Outpatient MR	33.2%	35.3% (+2.1%)	BILH (-0.6%)
Outpatient PET/CT	32.7%	38.9% (+6.2%)	BILH (-2.7%)
Outpatient Cardiovascular Procedures	32.1%	32.4% (+0.3%)	BILH (-0.1%)

Outpatient Oncology	34.6%	37% (+2.4%)	BILH (-0.9%)

CRA describes the Herfindahl-Hirschman Index (HHI), which is a relied upon measure of hospital market concentration and was used when analyzing shifts in market share for the ICA. The ICA indicates the Federal Trade Commission and Department of Justice guidelines ("Guidelines") define unconcentrated markets as those with an HHI below 1,500, moderately concentrated market as those between 1,500 and 2,500, and highly concentrated markets as those above 2,500. CRA also notes that the Guidelines indicate changes of less than 100 HHI points in concentrated markets are unlikely to lead to adverse competitive effects.

The ICA assigned an HHI qualifying as "highly concentrated" for each of the service lines examined[52] in the Proposed Project prior to implementation of the Proposed Project. The HHIs for each service line ranged from 2,641 to 4,212. Upon implementation, scores for four out of six of these service lines increased by more than 100 points, the limit for changes that will not adversely impact competition.

In addition to the HPC comments, there were three additional comments on the ICA: the Applicant, the North Atlantic States Regional Council of Carpenters ("NASRCC") TTG, and David McDermott on behalf of a TTG. All of these commentors support the conclusions of the ICA. Areas highlighted by these commentors include:

- Support for the recognition of the growth of the 65+ population in the service area and their care needs
- Noting the growth in inpatient days, particularly for heart and vascular services
- Predicted further increase in demand for inpatient services across all lines at MGH for the next 5-10 years

The Applicant describes in its comments the differences between the HPC and ICA approaches, asserting that the HPC does not take into account future demographics and utilization trends. The Applicant asserts that MGH cannot meet its current demand for inpatient care, a problem that negatively affects access, quality, and patient experience, and also highlights patient choice.

Full text of all comments on the ICA are available on the DoN website.

Cost Containment – Analysis

Two of the Applicant's stated goals for MGB's system-wide strategy, of which the Proposed Project is part, include "reducing the total cost of health care by developing delivery models that focus on value" and "improving health outcomes across the full continuum of care with an

[52] Adult inpatient discharges, outpatient CT, MRI and PET/CT scans, outpatient cardiovascular procedures and outpatient oncology services.

emphasis on the development by Mass General Brigham's academic medical centers of multidisciplinary centers of excellence for tertiary and quaternary care." Together, these two goals support patients accessing care in the most cost-effective while appropriate setting. To address concerns around backfilling newly available capacity at MGH, adding capacity at MGH, and serving patients appropriate for care outside of an academic medical center, the Department recommends a condition that monitors patient acuity to ensure patients served by the Proposed Project are appropriate for tertiary and quaternary care.

Staff notes DoN's ability to require the Applicant to limit the project to the need described, and in this context has considered ICA commenter's projections about backfill and other issues about what might happen throughout the Applicant system. Conditions recommended in the report are geared accordingly, focused on MGB serving its existing Patient Panel, to which their projected cost savings are tied.

MGB asserts the Proposed Project will meet its Patient Panel need by improving patient flow and helping to eliminate delays in care at MGH due to boarding, and by addressing additional patient demand in the future. CRA's analysis concludes that serving the need of MGB patients, as well as the volume of patients it estimates would switch to MGH, would result in modest cost increase of 0.2%.

However, as noted by the HPC, neither MGB nor the ICA has not accounted for backfill of previously full capacity at MGH that will be moved to its proposed ambulatory expansion. In the AGO's report for the HPC's annual cost trends hearings, the office notes that the margin increase due to patients referring to MGB hospitals (which would include MGH) outweigh the projected losses. Supporting this, the HPC indicates the Proposed Project would "drive significant patient volume and revenue" estimating the expanded MGH capacity and backfilling would add $30.3M to $54.4M to commercial insurance costs annually. With these annual increases, it is important to note that CRA's analysis in the ICA indicates public payors could see significant spending increases per patient for certain service lines, such as the estimated 121.2% CRA estimates would be the case for Medicare Health Plans for inpatient cancer services and the 82.7% increase for MassHealth Managed Care for the same services.

Moreover, HPC notes that MGB's future utilization projections do not take into account capacity at other providers and do not necessarily demonstrate the Proposed Project – particularly additional capacity – is necessary to meet needs of patients currently lacking access. The HPC further comments that many of the services MGB is proposing to expand can be considered routine care available at other high-quality providers in Massachusetts. HPC estimates the increase in MGB's inpatient capacity would allow it to increase its market share by approximately 3% to 4%. HPC concludes these shifts will have significant impact on costs to commercial insurers, approximately $23.7M to $40.6M annually. HPC also notes that CRA diminishes significant cost increases for payors, as seen in the 112.2% increase per patient for

Medicare Health Plans for inpatient cancer services, cited above. These annual increases in commercial insurer spending coupled with MGB's articulation of its Patient Panel need which primarily calls for removing patient bottlenecks leading to delays in care raise significant concerns with the Applicant's request to add an additional 94 inpatient beds at MGH. To mitigate this concern, the Department recommends disapproval of these beds.

It is also worth noting that the HPC is requiring MGB to develop a performance improvement plan (PIP) that must include strategies, action steps, and measurable expected outcomes to improve their spending performance. This is the first PIP the HPC has required and speaks to the significant concerns of the HPC regarding MGB's costs to the healthcare system. The standard condition set forth at 105 CMR 100.310(A)(18) indicates that should the HPC find that Holder of a determination of need required to develop and file a PIP is not fully complying with the PIP, the Holder must report to the Department as to why the Holder should still be deemed in compliance with the terms and conditions of the determination of need approval.

Thus, the cost containment components of Factor 2 and Factor 4 are met with conditions.

Improved Public Health Outcomes

The Applicant states that the Proposed Project will improve public health outcomes in the following ways:

- Creating additional inpatient capacity and private rooms will reduce the number of blocked beds thereby decreasing inpatient capacity; address throughput issues in the ED and PACU resulting from a lack of private rooms; and improve access to timely care in the appropriate setting.
- Reducing the time patients (both high and low acuity) wait to receive care, including patients waiting for admission to an inpatient bed and patients presenting to the ED who do not require inpatient admission. Reducing wait times and the associated backlogs that it creates, will also help to reduce the workload of staff in different care areas, which will improve quality of care.
- Expanding and co-locating cancer and cardiac services to improve access to care, care coordination, and quality of care for patients with cancer and cardiac disease. Co-locating these services in one building with a continuum of care will promote efficient, patient-centered care, support team-based care, and improve timeliness and effectiveness of services.
- Continued access to PHM programs that are focused on improving health outcomes. These are described below in Appendix V.
- Enhancing MGH's role as a regional resource for access to high-level, critical care that is not available locally. This is described above in Factor 1a.

The Applicant also described its prevention programming as it relates to cancer and cardiac disease:

Cardiovascular Disease Prevention Center at the Heart Center provides prevention-as-treatment approach for patients who have heart disease or who are at risk for developing heart disease, and includes screening and prevention education, research on improvement of preventive measures, and training preventive cardiology specialists. The Prevention Center offers three unique programs for patients of all risk levels to assist with prevention and treatment: the Heart Attack Primary Prevention Program, the Cardiac Rehabilitation Program, and the Cardiac Metabolic Syndrome Program. A full description of each program can be found in DoN Responses.

Cancer Center Equity Program. With a focus on patients that frequently have higher mortality rates, the program partners with MGH-specific programs and initiatives (*i.e.,* MGH CARE, Center for Community Health Improvement), to assess barriers and improve education for cancer care. This is described above in Factor 1c.

Analysis: Public Health Outcomes

Preventive care reduces risk of disease, death, and disability, and preventive services are an important part of population health.[jj,kk] It is well established that CVDs can be prevented through addressing modifiable risk factors; the 2019 American College of Cardiology/American Heart Association (ACC/AHA) Guideline on the Primary Prevention of Cardiovascular Disease makes recommendations for preventing CVDs by addressing these same risk factors through lifestyle changes.[ll] It has been estimated that 30%–50% of cancers diagnosed today could be prevented by reducing exposure to tobacco smoke and other environmental carcinogens, maintaining a healthy body weight, and receiving recommended cancer screenings and vaccinations.[mm]

Studies have shown that few Americans receive all of the appropriate clinical preventive services.[nn] The Applicant provides prevention programming to its patients as it relates to the Proposed Project and has included annual reporting measures to track CVD disease prevention and management program offerings to the Patient Panel and to the broader community.

The Applicant has demonstrated its commitment to improving public health outcomes and this part of Factor 2 has been met.

Delivery System Transformation

Overall, the Applicant notes that Delivery System Transformation will be addressed through linking patients to social service programs through its social determinants of health (SDoH) screening and referral processes, and through its anchor institution strategies.

SDoH Screening

The Applicant and MGH have a long-term goal to implement a universal SDoH needs screening program for all patients. MGH already screens certain patients for SDoH needs as a part of the MassHealth ACO model of care, and patients are asked about assistance needed and receive follow-up on SDoH resources, with patients who would like help immediately prioritized. Screenings are conducted via iPads, and the screening tool is available in multiple languages

and staff are available for technological assistance. MGH is integrated into MGB's electronic record system, which will enable specialty care staff and PCPs to have access to screening information.

The Applicant states the MGB and MGH have been thoughtful about the implementation of a universal SDoH screening program, recognizing that there is a limited amount of capacity within the community-based organizations that patients will be linked to for services and is taking a staggered approach to implementation, so that available community resources are not overwhelmed by referrals. Staff inquired about MGB's staggered approach to implementation and existing capacity for addressing SDoH needs. The Applicant states that with current funding available, MGB identifies need within its communities based on its CHNA and internal data and those communities with the highest need are prioritized. As sites are assessed for success/impact, additional funding will be allocated to support rollout to additional sites. Additionally, the Applicant and its member hospitals align their efforts to address their patients SDoH needs through the programs and organizations supported as directed by each hospital's Community Health Needs Assessment and Community Health Improvement Plan (CHIP). The Applicant also provides support to social service organizations to enhance their sustainability and build their capacity through its community benefits programs.

Anchor Strategy

The Applicant states that it seeks to further impact the SDoH through implementing an anchor institution strategy through the Proposed Project.[53]

The Applicant and MGH are members of the national Healthcare Anchor Network.[54] The Applicant states that the Hospital President and board member attended one of the Network's meetings for hospital leaders in 2020. To date, the Applicant has made two anchor investments: one for housing in Chelsea and one for food access. The Applicant asserts that MGH seeks to address the underlying causes of poor health by investing in the social and economic well-being of the communities it serves, and this will be achieved in part through leveraging MGH's business practices around local hiring and workforce development, local and diverse sourcing, and place-based investing. The Applicant states that it is through these anchor investments, that MGH will address the upstream causes of health, to ultimately improve health status.

The Applicant has undertaken the following anchor investments activities through the Proposed Project:

[53] Anchor institutions can be defined as nonprofit institutions that once established tend not to move location and grow in importance to local economies. The largest and most numerous anchor institutions are universities and non-profit hospitals. Anchor institutions have the economic potential to leverage their assets and revenues to promote local private sector development through directing a greater percentage of their purchasing power towards local vendors based in the community, hiring a greater percentage of their workforce locally, providing workforce training in the community, and investing in local job creation strategies.

[54] Healthcare Anchor Network (HAN) exists to incubate and scale strategies that establish the anchor mission as a healthcare sector priority and to lead innovation in anchor mission implementation, both internally and in partnership with community. The long-term goal is to reach a critical mass of health systems adopting as an institutional priority to improve community health and well-being by leveraging all their assets, including hiring, purchasing, and investment for equitable, local economic impact.

- Planning anchor level efforts through creation of management and trustee level communities.
    - Trustee Committee charged with overseeing the anchor strategies for the Proposed Project, setting goals, and holding management accountable. The Committee has met three times.
    - Management Committee led by Senior Vice President for Administration and Finance, with membership including the Hospital's President, general contractors, and Vice Presidents of equity and community health.
- Studying local projects that were developed with an anchor strategy for guidance in developing, planning, and measuring the Hospital's anchor strategies.
- MGH commitment to partner with apprenticeship programs to meet construction trade hiring goals for City of Boston residents.
- MGH commitment to hire for new positions in accordance with its anchor strategies.

Analysis: Delivery System Transformation

Central to the goal of delivery system transformation is the integration of social services and community-based expertise. The Applicant has described, at a high level, how patients in the panel are assessed and how linkages to social services organizations are created. The Applicant is a MassHealth ACO (MGB MassHealth ACO) and a Medicare ACO (MGB Medicare ACO - Medicare Share Savings Program). As such, it has ongoing incentives to address population health needs and SDoH. The United State Department of Health and Human Services' program Healthy People 2030 includes five overarching goals, one of which is related to SDoH.

Many of its objectives related to SDoH highlight the importance of upstream factors in improving health and reducing health disparities.[oo,55] Reducing health disparities and advancing health equity requires an examination of the interconnected aspects of public health problems, as well as the structural and system inequities that contribute to health disparities.[pp] For example, food insecurity has been shown to be associated with significantly greater healthcare utilization, including ED visits and inpatient admissions.[qq] The COVID-19 pandemic has revealed longstanding disparities and inequities in health and health care and demonstrates the important role of the SDoH in advancing health equity.[rr]

Through its SDoH screening programming, and anchor institution strategies, the Applicant has demonstrated its commitment to delivery system transformation and this part of Factor 2 has been met.

SUMMARY for FACTOR 2

While identifying expected cost increases, the ICA concluded that the Proposed Project meets cost containment goals. In its comment on the ICA, the HPC states that its analysis show that it

[55] Healthy People 2030 sets data-driven national objectives to improve health and well-being over the next decade. Objectives are developed by workgroups made up of subject matter experts in specific topics. Healthy People 2030 includes 355 core or measurable objectives as well as developmental and research objectives. Released by the US Department of Health and Human Services (HHS) every 10 years since 1980. Healthy People 2030 is the fifth iteration of the initiative.

is likely to increase annual commercial spending, drive substantial patient volume and revenue to the higher-cost MGB system—particularly commercially insured volume—resulting in increased health care spending, increased commercial insurance premiums, and a negative impact on health care market functioning, including access and equity. However, the Proposed Project's potential to improve public health outcomes, including access to care and the reduction of ED boarding and to improve delivery system transformation is found to meet the Factor. Therefore, on balance, staff finds that Factor 2 is met, with conditions articulated in this section.

Factor 3: Relevant Licensure/Oversight Compliance

The Applicant has provided evidence of compliance and good standing with federal, state, and local laws and regulations and will not be addressed further in this report.

Factor 4: Demonstration of Sufficient Funds as Supported by an Independent CPA Analysis

Under factor 4, the Applicant must demonstrate that it has sufficient funds available for capital and operating costs necessary to support the Proposed Project without negative effects or consequences to the existing Patient Panel. Documentation sufficient to make such finding must be supported by an analysis by an independent CPA.

The scope of the analysis included review of the ten-year consolidated financial projections prepared by Mass General Brigham, the actual operating results for Mass General Brigham for the fiscal years ended 2019 and 2020, the relevant background information and supporting documents.[56] It performed an analysis of the financial projections prepared by Mass General Brigham Incorporated detailing the projected operations of MGB impact of capital projects involving and ancillary to the Cambridge Street Building in Boston, MA. The review included analysis of key metrics that fall into three categories: liquidity, operating and solvency.[57] The CPA states that in its opinion the analysis of key financial metrics is reasonable in relation to the company's past performance and peer group based on comparison to market information.

1. Revenues

[56] Ten-Year Pro-Forma Statements (Projections) for the fiscal years ending 2021 through 2030, provided on December 15, 2020 and updated January 8, 2021;projected income statements for the Cambridge Street Building for the fiscal years ending 2025 through 2030, provided on December 15, 2020;DoN Projections (income statements, capital and debt service) for the fiscal years 2021 (budget) through 2030, provided December 15, 2020; Multi-Year Financial Framework of Mass General Brigham Incorporated for the fiscal years ending 2021 through 2025 prepared for Mass General Brigham Finance Committee as of December 3, 2020; schedule of Estimated Total Capital Expenditure (Factor 4 Form F4a.ii) provided December 29, 2020; Cambridge Street Building Project Presented for Capital Approval to the Partners Finance Committee, prepared as of September 27, 2019; Audited Financial Statements of Mass General Brigham Incorporated and Affiliates as of and for the years ended September 30, 2020 and 2019; Company website – https://www.massgeneralbrigham.org; news publications and other public information about Mass General Brigham; Determination of Need Application Instructions dated March 2017; and draft Determination of Need Factor 1, provided December 29, 2020 and updated on January 14, 2021.

[57] Liquidity metrics, measure quality and adequacy of assets to meet current obligations as they come due. Operating metrics, such as earnings before interest, taxes, depreciation, and amortization ("Adjusted EBITDA") are used to assist in the evaluation of management performance in how efficiently resources are utilized. Solvency metrics, such as Debt to Equity, measure the company's ability to service debt obligations.

The revenue category on which the proposed capital projects would have an impact is net patient service revenue (NPSR). The CPA reports the first year in which revenue is present for the proposed capital projects is FY 2025, and that beginning in that year the proposed capital projects would represent approximately 0.642% (about 7 tenths of 1%) of total operating revenues and would increase to 1.795% in FY 2030. As a result of its review, based primarily upon the Company's historical operations before taking into account the financial impact of the COVID-19 pandemic in Fiscal Year 2020, the CPA concluded that the revenue growth projected by Management is a reasonable estimation.

2. Operating Expenses

The CPA analyzed each category of historical (FY 2019 and 2020) and projected operating expenses in order to determine the impact of the proposed capital projects on the consolidated entity and in order to determine the reasonableness of the Projections for the fiscal years 2021 through 2030. The analysis of the projected results from Fiscal Year 2021 through Fiscal Year 2025 indicated that the proposed capital projects would represent approximately .614% (about 6 tenths of 1%) of Mass General Brigham operating expenses and increase to 1.721% in FY 2030. Accordingly, in the CPA's opinion, the growth in operating expenses projected by Management reflects a reasonable estimation.

3. Non-operating Gains/Expenses and Other Changes in Net Assets

The various non-operating gains/expenses and other changes in net assets items[58] were analyzed the in aggregate, as they are non-operating activity. The analysis showed there were no non-operating expenses projected for the proposed capital projects. Accordingly, the CPA found that the pro-forma non-operating gains/expenses and other changes in net assets are reasonable.

4. Capital Expenditures and Cash Flows

The CPA then reviewed the Applicant's capital expenditures and cash flows in order to determine whether as a result of this Proposed Project, the cash flow would be able to support reinvesting sufficient funds for necessary technological upgrades and reinvestment in property, plant and equipment. The CPA considered the current and projected capital projects and loan financing obligations included within the Projections and the impact of those projected expenditures on the Applicant's cash flow and concluded that the resulting impact of pro-forma capital expenditures on Mass General Brigham cash flows are reasonable.

After considering multiple sources of information including historical and projected financial information for the Applicant, the CPA concluded that because the Cambridge Street Proposed Project *"represents a relatively insignificant portion of operating revenues (approximately 2%) and financial position (approximately 6%) of Mass General Brigham, I determined that the Projections are not likely to result in insufficient funds available for capital and ongoing operating costs necessary to support the proposed projects,"* and that the Proposed Project is

[58] relate to investment account activity (realized and unrealized), philanthropic and academic gifts, benefit plan funded status, fair value adjustments and other items

financially feasible. Accordingly, it determined that the Projections are reasonable and feasible, and not likely to have a negative impact on the Patient Panel or result in a liquidation of assets of MGB.

CPA Analysis

Staff is satisfied with the CPA's analysis of Applicants decision to proceed with the Proposed Project.

Independent Cost-Analysis

As noted in Factor 2, the Massachusetts Department of Public Health (DPH) required an Independent Cost-Analysis (ICA) for the Proposed Project to evaluate whether the Proposed Project would be consistent with the health care cost containment goals of Massachusetts. Please see the cost section of Factor 2 for discussion and analysis of the ICA.

Factor 4 Analysis

Staff finds that the CPA analysis to be acceptable and with conditions, the cost containment element of Factor 4 is met. Thus, with conditions, Factor 4 is met.

Factor 5: Assessment of the Proposed Project's Relative Merit

The Applicant considered and rejected eight alternatives to the Proposed Project in addition to the option of maintaining the status quo based on the assessment of the achievement of the Project's functional goals, outpatient and inpatient efficiency, ease of construction, and effectiveness.

Maintaining the status quo, that is, to continue operating without any changes at MGH's Main Campus, would not address several issues such as ED boarding (capacity and waiting times), PACU waiting times, inpatient LOS, and patient satisfaction. Patients not having access to updated facilities and the current industry standard of single patient rooms would continue to impact these issues. Additionally, limited inpatient capacity would worsen the problem of lost transfers of high-acuity patients from community hospitals, causing further delays in care. It would also not meet the current and future patient demand for cancer, cardiovascular, surgical, and imaging services and benefit from team-based care and other co-location benefits.

The Applicant analyzed eight alternatives and provided high-level conclusions on each.

Available information on the alternative options is highlighted below.

- Alternative 1: Ambulatory care would be disconnected from core services that would cause outpatient inefficiencies and a smaller footprint. [Capital expense: $1,750,000,000] -
- Alternative 2: This would involve more construction work with significant phasing complications that would lead to both inpatient and outpatient inefficiencies. [Capital expense: $1,700,000,000]

- Alternative 3: This option would be less effective and not meet functional efficiency goals for the inpatient components of the Project because inpatient services would be disconnected from core of the Project. Also, there would be construction difficulties and would reduce access for patients and families with significantly fewer parking spots. [Capital expense: $2,200,000,000]
- Alternative 4: While this option would be efficient for inpatient beds because they would be connected to core services, it would not be feasible because there would be significant operational disruption and construction difficulties. [Capital expense: $1,850,000,000]
- Alternative 5: Similar to Alternative 4 it would be efficient for inpatient beds but not feasible due to operational disruption. [Capital expense: $1,880,000,000]
- Alternative 6: Like Alternatives 4 and 5, it would not be feasible due to significant operational disruption and difficult construction phasing though efficient for inpatient beds. [Capital expense: $2,000,000,000]
- Alternative 7: The inpatient bed component would result in operational disruption and difficult construction phasing. [Capital expense: $2,300,000,000]
- Alternative 8: This option would be more difficult to implement due to the larger scale project that would maximize the number of private single bedrooms. [Capital expense: $1,830,000,000]

The Applicant asserts that alternatives 1 through 6 and 8 would result in fewer total beds that would not meet the projected demand for inpatient beds at MGH. Boarding time often does not allow for a typical or expected LOS, but additive for patients, which is not optimal for cost, efficiency, or patient satisfaction. In comparison, Alternative 7 would result in 50 more inpatient beds, which would be less efficient than the Proposed Project. They would also not address the Applicant's current situation of adding resources to inappropriate locations, such as the ED and PACU.

The Applicant indicates the alternatives would result in operational disruptions, construction difficulties, outpatient and/or inpatient inefficiencies and would not match the quality of the Proposed Project. The alternative options would also be more costly per bed, with additional costs ranging from approximately $462,736 to $3.5 million more per bed than the Proposed Project. While the Applicant did not analyze operating costs because it did not meet the Project's goals, they anticipated that the costs would either meet or exceed the Proposed Project's operating costs. Capital Expenses for the alternatives would be below, similar to, or above the Proposed Project's expenses.

Analysis

Staff finds that the Applicant has appropriately considered the quality, efficiency, and capital and operating costs of the Proposed Project relative to potential alternatives. As a result of information provided by the Applicant and with disapproval of the proposed net new inpatient beds and PET/MR at this time, staff finds the Applicant has reasonably met the requirements of Factor 5.

Factor 6: Fulfillment of DPH Community-based Health Initiatives Guideline: Overall Application

Summary and relevant background and context for this application:

The Applicant engaged in a new collaborative process in fulfilling their CHI requirements. They participated in both the Boston and North Suffolk CHNA/CHIPs, with the Boston CHNA/CHIP activities contributing to requirements for this DoN project. In coordinating with the larger CHNA/CHIP processes for Boston, the Applicant has utilized community-wide surveys, focus groups, and in person convenings to obtain community input, and also further engaged the community across stages of the CHNA/CHIP process from assessment through prioritization and project planning to ensure tailored focus for institution specific assessment.

For this project, the Applicant submitted a CHI Narrative, Self-Assessment with an addendum, Stakeholder Assessments, a Community Engagement Plan with an addendum, and the Community Health Needs Assessment and Community Health Improvement Plan from the regional collaborative. Given the timing of this larger process and additional engagement activities, rather than requesting a renewed Community Engagement Plan, DPH staff requested a narrative outlining distinct plans for enhanced engagement, strategy selection and implementation, and application of lessons learned. As with all DoN projects, staff requested further information on commitment to equity framing, timeline, and use of administrative funds.

- **In the Community Health Needs Assessment (CHNA) and Community Health Improvement Plan (CHIP)**, the Applicant provided a summary of socio-demographic data, community assets, and highlights of health outcome information related to these topics. Through a collaborative, city-wide process of data collection, analysis, gatherings, and strategic planning, the Applicant identified Housing Affordability and Access, Economic Mobility, Mental and Behavioral Health, and Accessing Services as key priorities. Multisectoral partnerships contributed to the CHIP, identifying efforts and action steps to address the four priorities. The reports and supporting documentation focused on the community health needs for Boston neighborhoods, and the Applicant worked with its Community Advisory Board to identify and implement additional Community Engagement activities to ensure a focus on populations and models prioritized by the Applicant.

- **The Self-Assessment and Addendum** provided a summary of community engagement processes and socio-demographic information, data and highlights related to topics and themes of community needs. Through data analysis, surveys, and key informant gatherings, the Applicant and other entities participating in the city-wide collaborative CHNA and CHIP identified the key priorities and strategies. Additionally, the Applicant worked with its CAB to identify areas of overlap with the institution-specific priorities and align efforts to collaborate with communities.

- **Stakeholder Assessments** submitted provided information on the individuals' engagement levels (e.g. their personal participation and role) and their analysis of how the Applicant engaged the community in community health improvement planning processes. The information provided in these forms were largely consistent with the self-assessment conducted by the Applicant.

- **The CHI Narrative and Community Engagement Plan** provided background information for, and explanation of existing CHNA/CHIP planning processes, including scope, goal, criteria, approach, and planned activities. These elements focused on the 2019 Community Health Needs Assessment for Boston and identified the level of engagement in activities both ongoing and planned. The narrative also outlines funding breakdown including planned use of administrative funds, and CHI activities.

- **The Community Engagement Plan Addendum or Narrative, requested by staff,** included more specifics on:
    - **Community Engagement** - The Applicant provided details on engagement of its CAB, transparent information sharing with the larger communities, outreach, capacity building, and process improvement. The Applicant will continue to ensure appropriate assessment and prioritization of needs through meaningful engagement of community residents and stakeholders. This will serve to align community engagement and CHI processes for the communities most involved and affected.
    - **Strategy Selection and Implementation** – The Applicant described its plans to complete a transparent investment process and leverage ongoing activities. The Applicant also demonstrated a commitment to equity framing, providing detail on how a racial equity framework will be utilized throughout all aspects of the CHI process, including appropriate use of the framing questions (*Who benefits, who is harmed, who influences, who decides, what might be some unintended consequences*) across decision making points.
    - **Lessons Learned** – In this section of the narrative, the Applicant described the feedback structure from its existing DoN CHI project work (PHS-19040915-HE). This structure includes constructive input and recommendations from those engaged, as well as some positive feedback on processes. The Applicant will continue to improve this process and use lessons learned to inform the work for this current DoN project application.

Summary Analysis: As a result of information provided by the Applicant and additional analysis, staff finds that with the conditions outlined below, and with their ongoing commitment to meaningful community engagement and based on planning timelines that staff will approve, the Applicant has demonstrated that the Proposed Project has met Factor 6.

Public Comments on the Application

Any person, and any Ten Taxpayer group, may provide written or oral comment at any time during the first 30 days following the Filing Date of an Application, or during the first ten days after a public hearing.

Public Hearing

The Department held a virtual public hearing in connection with the Proposed Project on March 23, 2021. A total of 45 people provided oral comments at the public hearing. None of the oral comments received were in opposition to the Proposed Project. All of the oral comments at the public hearing were in support of the Proposed Project. Pursuant to the DoN regulation, the Department determines whether need exists for a Proposed Project, based upon whether the Applicant meets each of the relevant factors set out in those regulations. Oral comments provided at the public hearing for consideration in DoN's review and analysis would be ones that address the Applicant's ability to meet the requirements of each of the relevant factors. The transcript of the public hearing is available online on the DoN website. The names of those testifying at the hearing are listed in Appendix VII, and a summary of comments is in Appendix VIII.

Written Comment

The Department received a total of 39 written comments: 38 written comments were in favor of the Proposed Project and one written comment was opposed to the Proposed Project. Pursuant to the DoN regulation, the Department determines whether need exists for a Proposed Project, based upon whether the Applicant meets each of the relevant factors set out in those regulations. Comments for consideration in our review and analysis would be ones that address the Applicant's ability to meet the requirements of each of the relevant factors. The names of those submitting written comments are listed below in Appendix IX and a summary of the written comments is provided below in Appendix X. The comments are separated into two categories: comments that were in favor of the Proposed Project and comments that were opposed to the Proposed Project. The full text of written comments is available online on the DoN website.

Ten Taxpayer Groups (TTGs)

Pursuant to the DoN Regulation, any ten Taxpayers, organized as a group, may participate in the review of an Application for Determination of Need or request to amend a previously issued Notice of Determination of Need. Said group must register with the Department at any time during the first 30 days following the Filing Date of an Application, or during the first ten days after a public hearing held pursuant to 105 CMR 100.445.

Eleven Ten taxpayer groups (TTGs) registered in connection with the Proposed Project. Registration information for each TTG is available on the DoN website. The names of the TTGs and their participation in the review process can be found in Appendix XI. Additional information including full text of comments is available on the DoN website.

Findings and Recommendations

Based upon a review of the materials submitted Staff recommends approval of the Proposed Project with conditions. In addition to all applicable Standard Conditions, the Applicant must meet the conditions listed below. Failure of the Applicant to comply with these conditions may result in Departmental sanctions including revocation of the DoN. The conditions discretionary with the Department, pursuant to 105 CMR 100.552 are:

Conditions to the DoN

Condition 1 – CHI Contribution

1. Of the total required CHI contribution of $93,763,711.90
    a. $22,972,109.42 will be directed to the CHI Statewide Initiative
    b. $68,916,328.24 will be dedicated to local approaches to the DoN Health Priorities
    c. $1,875,274.24 will be designated as the administrative allowance
2. To comply with the Holder's obligation to contribute to the Statewide CHI Initiative, the Holder must submit a check for $22,972,109.42 to Health Resources in Action (the fiscal agent for the CHI Statewide Initiative).
        i. The Holder must submit the funds to HRiA within 30 days from the date of the Notice of Approval.
        ii. The Holder must promptly notify DPH (CHI contact staff) when the payment has been made.

Condition 2 – If the Holder submits any request for Significant Change to add any of the 94 new inpatient beds[59] related to the Proposed Project, the Holder must include the following data as part of its Application:

a. Emergency Department (ED) boarders waiting for a medical/surgical (M/S) bed including
    i. Number of patients and length of stay
    ii. Location of bed (inpatient or observation)
b. Post Acute Care Unit (PACU) patient data including
    i. Number of patients and length of stay
    ii. Location of bed (inpatient or observation)
c. Average daily number of blocked M/S beds
d. Percentage (with numerator and denominator) of MGH inpatients who were part of MGB's Patient Panel prior to the MGH admission
e. Operating capacity and occupancy rate

[59] The Applicant can request to add any of these beds via a Significant Change request and the beds may be located in any appropriate space on the MGH campus.

f. Acuity level by case mix index, and number of discharges for M/S patients at MGH by service line:
    i. Cancer
    ii. Cardiac
    iii. Other Adult M/S (with exclusion of obstetric, pediatric, and psychiatric discharges)
g. Average monthly lost transfer number and rate (calculated as the number of transfers not accepted over the number of requests for transfers) from community hospitals

$$\frac{\text{Number of transfers not accepted by Holder}}{\text{Number of requests for transfers to Holder}}$$

Condition 3 – If the Holder submits any request for Significant Change to add a new PET/MR unit, the Holder must include the following:

a. Number of PET/MR scans conducted at MGH, separated by research and clinical scans. Include the number of scans broken out by PET/MR and MRI only.
b. Wait times for PET/MR scans at MGH.
c. Acuity by case mix index of patients receiving PET/MR scans at MGH.
d. Average time per PET/MR scan.
e. Hours current PET/MR scan is available for clinical use.

Condition 4 – To ensure the Proposed Project is addressing inpatient Patient Panel need by reducing existing capacity constraints, one year after receiving the Notice of DoN, the Holder must provide as baseline data the below metrics, and as each part of the Proposed Project is implemented, begin reporting the following information as part of the annual report required by 105 CMR 100.310(A)(12):

1. With respect to Imaging
    a. Number of MRI, CT or PET/CT scans, by modality, for MGH Main Campus
    b. Wait time for inpatients who require MRI, CT or PET/CT scans, by modality, at MGH Main Campus
    c. Wait times for MRI, CT, or PET/CT scans, by modality, for units approved in this DoN, separated by inpatient and outpatient use
    d. Wait times for the Somerville and Waltham sites for MRI, CT or PET/CT scans, by modality
    e. Number of patients receiving MRI, CT or PET/CT scans at MGH Main Campus, by modality, for:
        i. Inpatient
        ii. Outpatient
        iii. ED

f. Average time per MRI, CT or PET/CT scans at MGH Main Campus, by modality
g. Hours of operation, per unit, of all the MRI, CT and PET/CT units at MGH Main Campus

2. With respect to Cardiovascular services
    a. The average wait times for ED patients, outpatients, and inpatients for cardiovascular procedures including utilization of all hybrid operating rooms measured by
        i. Number of procedures by type (catheterization, interventional, electrophysiology, surgery)
        ii. Average time per procedure by type (see 2.a.i)
    b. Acuity by case mix index of inpatients who have cardiovascular procedures performed at the new cardiac center approved in this DoN.

    c. Percentage (with numerator and denominator) of patients who had a cardiovascular procedure, by procedure type (see 2.a.i), who were part of the MGB Patient Panel before the cardiovascular procedure (calculated for each procedure type as the number of patients who had (cardiovascular procedure type) who were part of the MGB Patient Panel as defined by regulation at the time of this approval over the total number of patients who had a cardiovascular procedure)

$$\frac{\text{the number of patients who had (cardiovascular procedure type) who were part of the MGB Patient Panel}}{\text{\# of pts who had (cardiovascular procedure type)}}$$

3. With respect to Oncology service
    a. The number of outpatient visits performed at the new cancer center approved in this DoN.
    b. Average case mix for oncology admissions
    c. Wait time for outpatient visits at the new cancer center.
    d. Utilization (number and utilization rate) of infusion bays in the new cancer center by
        i. General infusion
        ii. Observation
    e. Percentage (with numerator and denominator) of infusion patients who were part of the MGB Patient Panel (calculated as the number of patients who received an infusion who were part of the MGB Patient Panel as defined by regulation at the time of this approval over the total number of infusion patients)

$$\frac{\text{\# of infusion pts who were part of the MGB Patient Panel}}{\text{\# of infusion pts}}$$

4. With respect to Inpatient
    a. Boarding
        i. ED boarders waiting for a M/S bed including number of patients and length of stay
        ii. PACU patient data including number of patients and length of stay
    b. Average daily number of blocked M/S beds
    c. Operating capacity
    d. Occupancy rate
    e. Acuity level by case mix index, and number of discharges for M/S patients at MGH by service line:
        i. Cancer
        ii. Cardiac
        iii. Other Adult M/S (with exclusion of obstetric, pediatric, and psychiatric discharges)
    f. Average monthly lost transfer number and rate (calculated as the number of transfers not accepted over the number of requests for transfers) from community hospitals

$$\frac{\text{Number of transfers not accepted by Holder}}{\text{Number of requests for transfers to Holder}}$$

The DoN program shall review the data received from MGB in accordance with Condition 4 to determine whether one or more of the following Referral Indicators is present:

Any of the following will be Referral Indicators:

1. A material increase in 1b, 1c, 1d, 2a, 3c, 4(a)(i), 4(b), 4f
2. A material decrease in 2b, 2c, 3b, 3d, 3e, 4d, 4e

If the DoN Program finds any one or more of the Referral Indicators, the matter shall be referred to the Public Health Council (PHC) for review to determine whether MGB is in violation of one or more of the conditions and thus out of compliance with the terms of this Notice of DoN.

Upon referral to the PHC based upon any one or more of the Referral Indicators, MGB shall have an opportunity to show cause why the PHC shall not find one or more of the Referral Indicators.

Recommendation

With inclusion of the above conditions, Staff recommends approval of this request for Substantial Capital Expenditure/Substantial Change in Service

Appendices

Appendix I: Reporting Measures

In addition to the measures in the conditions and those proposed by the Applicant below, the Applicant is required to report on:

> For each of the PET/MR units, reporting on the type of utilization by category: research, PET/MR scans (inpatient and outpatient), MRI overflow (inpatient and outpatient).

Measures initially suggested by Applicant and revised by staff:

Inpatient Beds

1. **Patient Experience/Satisfaction – Care Coordination:** Patients that are satisfied with care are more likely to seek additional treatment when necessary. MGH staff will review ratings of satisfaction with the care coordination of inpatient services via NRC Health Survey scores. Due to the efficiencies created with the Proposed Project, including co-location of services and the improvements that will allow for increased team-based care in the Centers of Excellence model, MGH anticipates that inpatients will report favorably on care coordination among their providers.

   Measure: The Applicant will collect and provide data related to the overall satisfaction of the coordination of care between doctors and nurses provided as follows: (a) Satisfaction rate for patients receiving inpatient service; (b) Patient response rate with a breakdown of respondents by race; and (c) Any policy changes instituted as a result of the Applicant's evaluation of lower ratings.

   Projections: As the Proposed Project will not be implemented for several years, the Applicant will provide baseline measures and three years of projections one year prior to implementation of the Proposed Project.

   Monitoring: The Applicant will report this data to DPH on an annual basis.

2. **Patient Experience/Satisfaction – Room Environment – Noise:** Patients that are satisfied with care are more likely to seek additional treatment when necessary. MGH staff will review ratings of satisfaction with the quietness of inpatient rooms via NRC Health Survey scores. Due to the increased number of private rooms, MGH anticipates that inpatient satisfaction ratings will improve.

   Measure: The Applicant will collect and provide data related to the overall satisfaction of the noise level around the patient's room at night provided as follows: (a) Satisfaction rate for patients receiving inpatient service; (b) Patient response rate with a breakdown of respondents by race; and (c) Any policy changes instituted as a result of the Applicant's evaluation of lower ratings.

Projections: As the Proposed Project will not be implemented for several years, the Applicant will provide baseline measures and three years of projections one year prior to implementation of the Proposed Project.

Monitoring: The Applicant will report this data to DPH on an annual basis.

3. **Catheter-Associated Urinary Tract Infection (CAUTI):** MGH will review the incidence of CAUTI across its ICU and medical/surgical patients. Due to increased efficiencies and improved care coordination, MGH anticipates that it will perform well on this quality measure.

   Measure: The Applicant will collect and provide data using the publicly reported CAUTI Standardized Infection Ratio from the National Healthcare Safety Network.

   Projections: As the Proposed Project will not be implemented for several years, the Applicant will provide baseline measures and three years of projections one year prior to implementation of the Proposed Project.

   Monitoring: The Applicant will report this data to DPH on an annual basis.

4. **Inpatient Falls with Injury:** MGH will review the incidence of inpatient falls resulting in injury. Due to increased efficiencies and improved care coordination, MGH anticipates that it will perform well on this quality measure.

   Measure: The Applicant will collect and provide data using the NDNQI measure as follows: the number of falls per 1,000 inpatient days resulting in a "minor" or greater category of injury.

   Projections: As the Proposed Project will not be implemented for several years, the Applicant will provide baseline measures and three years of projections one year prior to implementation of the Proposed Project.

   Monitoring: The Applicant will report this data to DPH on an annual basis.

5. **ED Boarding:** This measure reviews the amount of time a patient must wait in the ED for a medical/surgical, cancer or cardiac inpatient bed prior to being admitted to MGH. Due to increased inpatient bed capacity, MGH anticipates that ED boarding time will be reduced.

   Measure: The Applicant will collect and provide data related to the ED boarding time for inpatients.

   Projections: As the Proposed Project will not be implemented for several years, the Applicant will provide baseline measures and three years of projections one year prior to implementation of the Proposed Project.

   Monitoring: The Applicant will report this data to DPH on an annual basis.

6. **Lost Transfers:** This measure reviews the instances of clinically accepted patients who were ultimately not admitted to MGH, resulting in a lost transfer. Lost transfers are often due to lack of inpatient bed capacity. Due to increased inpatient bed capacity through the Proposed Project, MGH anticipates that lost transfers will be reduced, ensuring MGH can continue to be a regional resource for high-acuity patients presenting to community hospitals.

   Measure: The Applicant will collect and provide data related to lost transfers.

   Projections: As the Proposed Project will not be implemented for several years, the Applicant will provide baseline measures for the most recent three years and three years of projections one year prior to implementation of the Proposed Project.

   Monitoring: The Applicant will report this data to DPH on an annual basis.

7. **Blocked Beds:** This measure reviews the instances of closed beds due to patient incompatibility. The high number of semi-private rooms leads to the closure of 30-50 beds per day due to patient incompatibility. Through the Proposed Project, the Hospital will increase its proportion of private rooms, thereby reducing the instances that beds are closed.

   Measure: The Applicant will provide data on the average number of closed beds per month.

   Projections: As the Proposed Project will not be implemented for several years, the Applicant will provide baseline measures for the most recent three years and three years of projections one year prior to implementation of the Proposed Project.

   Monitoring: The Applicant will report this data to DPH on an annual basis.

Cancer Center

1. **Patient Experience/Satisfaction:** Patients that are satisfied with care are more likely to seek additional treatment when necessary. The Applicant is in the process of changing its patient survey vendor and the exact survey questions for the cancer service have not yet been determined. Due to increased capacity, enhanced care coordination, and co-location of services, patient satisfaction will improve.

   Measure: This measure will be provided upon implementation of the Proposed Project.

   Projections: As the Proposed Project will not be implemented for several years, the Applicant will provide baseline measures for the most recent three years and three years of projections one year prior to implementation of the Proposed Project.

Monitoring: The Applicant will report this data to DPH on an annual basis.

2. **ED Avoidance:** The Proposed Project seeks to reduce avoidable emergency department utilization through increased outpatient capacity at the Cancer Center. Due to this increased outpatient capacity, MGH anticipates that the number of avoidable ED visits by Cancer Center patients will decrease, with a corresponding increase in number of urgent care visits, in furtherance of the Proposed Project's objective of providing care in the most appropriate setting.

   Measure: Number of urgent care visits by patients with a cancer diagnosis.

   Projections: As the Proposed Project will not be implemented for several years, the Applicant will provide baseline measures for the most recent three years and three years of projections one year prior to implementation of the Proposed Project.

   Monitoring: The Applicant will report this data to DPH on an annual basis.

3. **Wait Times:** The Proposed Project seeks to ensure timely access to cancer care. Due to increased outpatient capacity and expanded hours for cancer services, the Applicant anticipates that wait times for new patient appointments at the Cancer Center will decrease.

   Measure: Number of days for a new patient to be scheduled for an initial appointment at the Cancer Center.

   Projections: As the Proposed Project will not be implemented for several years, the Applicant will provide baseline measures for the most recent three years and three years of projections one year prior to implementation of the Proposed Project.

   Monitoring: The Applicant will report this data to DPH on an annual basis.

Heart Center

The Applicant proposes to collect and report on the following measures related to the cardiovascular outpatient component of the Proposed Project.

1. **Patient Experience/Satisfaction:** Patients that are satisfied with care are more likely to seek additional treatment when necessary. The Applicant is in the process of changing its patient survey vendor and the exact survey questions for the cardiac service have not yet been determined. Due to increased capacity, enhanced care coordination, and co-location of services, MGH anticipates that patient satisfaction will improve.

   Measure: This measure will be provided upon implementation of the Proposed Project.

   Projections: As the Proposed Project will not be implemented for several years,

the Applicant will provide baseline measures for the most recent three years and three years of projections one year prior to implementation of the Proposed Project.

Monitoring: The Applicant will report this data to DPH on an annual basis.

2. **Disease Prevention and Management:** Disease prevention and early intervention often results in better health outcomes and lower overall health care costs. Accordingly, MGH will review cardiovascular disease ("CVD") prevention and management program offerings to its patient panel and monitor the participation rate in these programs.

   Measure: The Applicant will report on programs or initiatives designed to either reduce risk factors for CVD and/or assist the Patient Panel in managing their CVD. This shall include:

   a. Program description and length (if applicable)
   b. Program recruitment (if applicable) and number reached out to
   c. Total number of participants
   d. Percentage of participants from racial/ethnic minority groups
   e. Any outcomes measured

   Projections: As the Proposed Project will not be implemented for several years, the Applicant will provide baseline measures and three years of projections one year prior to implementation of the Proposed Project.

   Monitoring: The Applicant will report this data to DPH on an annual basis.

3. **Disease Prevention and Management:** Disease prevention and early intervention often results in better health outcomes and lower overall health care costs. Accordingly, MGH will review cardiovascular disease prevention and management program offerings to the broader community and monitor the participation rate in these programs.

   Measure: The Applicant will report on program initiatives designed to either reduce risk factors for CVD and/or assist the broader community in managing their CVD. This shall include:

   a. Program description and length (if applicable)
   b. Program recruitment (if applicable) and number reached out to
   c. Total number of participants
   d. Percentage of participants from racial/ethnic minority groups
   e. Any outcomes measured

   Projections: As the Proposed Project will not be implemented for several years, the Applicant will provide baseline measures and three years of projections one year prior to implementation of the Proposed Project.

Monitoring: The Applicant will report this data to DPH on an annual basis.

Addition of Advanced Imaging Services: CT, MRI, PET/CT

The Applicant proposes to collect and report on the following measures for each of the advanced imaging modalities in the Proposed Project.

1. **Patient Experience/Satisfaction:** Patients that are satisfied with care are more likely to seek additional treatment when necessary. The Applicant is in the process of changing its patient survey vendor and the exact survey questions for the radiology service have not yet been determined. Due to increased imaging capacity and co-location of imaging with other health care services, MGH anticipates that patient satisfaction will improve.

   Measure: This measure will be provided upon implementation of the Proposed Project.

   Projections: As the Proposed Project will not be implemented for several years, the Applicant will provide baseline measures and three years of projections one year prior to implementation of the Proposed Project.

   Monitoring: The Applicant will report this data to DPH on an annual basis.

2. **Clinical Decision Support ("CDS"):** MGH will review providers' use of the American College of Radiology ("ACR") Clinical Decision Support Tool "ACR Select" for Adult imaging orders (or any subsequent CDS). MGH anticipates that it will continue to perform well with respect to ensuring unnecessary imaging is not provided.

   Measure: The Applicant will collect and provide data related to the use of CDS as follows: (a) data showing yearly changes in "low utility" or "marginal utility" orders; and (b) percentage of provider response to alerts provided by ACR Select (or any subsequent CDS).

   Projections: As the Proposed Project will not be implemented for several years, the Applicant will provide baseline measures and three years of projections one year prior to implementation of the Proposed Project.

   Monitoring: The Applicant will report this data to DPH on an annual basis.

3. **Important Finding Alert ("IFA"):** MGH will review the percentage of scans that triggered an IFA that the radiologist conducted a critical value report.

   Measure: The Applicant will collect and provide the following data: (a) % of IFAs where a critical value report was indicated; (b) % of critical value reports radiologists performed over the total number of IFAs; and (c) any policy changes instituted as a result of increasing critical value reporting.

Projections: As the Proposed Project will not be implemented for several years, the Applicant will provide baseline measures and three years of projections one year prior to implementation of the Proposed Project.

Monitoring: The Applicant will report this data to DPH on an annual basis.

Appendix II: Summary of Applicant's Asserted Inpatient Bed Need and Impact of Proposed Project.

Area	Issue	Asserted Need	Proposed Impact
Physical Plant / Double Rooms/Blocked Beds			
a. Aging Infrastructure and Double-Bedded Rooms	● 1/3 of inpatient care on MGH's Main Campus is provided in facilities built in 1940 and 1969. Only 38% of MGH's M/S beds are in private rooms. ● Renovation of the existing structures will not accommodate the stated need.	● Semi-private rooms create capacity constraints throughout various care areas. ● Private rooms are associated with better patient outcomes including decreased length of stay (LOS), resulting from a reduction in hospital-acquired infections (HAI), medication errors, transfers, and patient falls.	● Increase the percentage of single-bedded rooms from 38% to 88%, which will help relieve capacity constraints and improve outcomes and patient satisfaction.
a. Bed Blocks	● Daily circumstances such as infection, gender or age mismatches, end-of-life care, and patients exhibiting disruptive behavior result in blocked beds in double-bedded rooms.	● Inability to fully utilize all licensed and operational beds. ● Daily reduction in inpatient bed capacity.	● Provide patients with greater access to single-bedded rooms which will reduce the need to block beds each day. ● Enhance patient flow and decrease wait times.
Area	**Issue**	**Asserted Need**	**Proposed Impact**
Boarding and Throughput of Medical Patients / Delays in Access to Inpatient Care			
b. ED Throughput	● MGH's high operating capacity and downstream impact of blocked beds impact ED boarding and wait times.	● Boarding inpatients in the ED contributes to ED crowding and adverse outcomes, and reduces treatment bay availability in the ED.	● Allow MGH to maintain efficient flow of patients from its ED to an inpatient bed. ● Alleviate extended boarding times and overcrowding.
c. PACU Throughput	● The lack of inpatient bed capacity is leading to	● Prolonged waiting in the PACU for an	● Alleviate PACU overcrowding and extended boarding times

		extended wait times in the PACU following the acute recovery period when a patient is ready to be admitted.	inpatient bed can increase LOS and may worsen patient outcomes.	and allow MGH to efficiently move patients out of its PACU for admission to an inpatient bed.
d.	**Transfers from Community Hospitals**	● MGH receives a high number of transfers requiring levels of care that cannot be provided by the patient's local community hospital.	● MGH is unable to meet the needs of all transfers from community hospitals due to inadequate inpatient capacity, resulting in transfer delays and denials.	● Alleviate capacity constraints on transfers from community hospitals and decrease the number of lost and delayed transfers to ensure access to the resources available at MGH that cannot be provided locally.
Area		**Issue**	**Asserted Need**	**Proposed Impact**
Patient Population/Acuity of Patients				
e.	**High Acuity Patients**	● MGH serves high acuity patients who require an academic medical center (AMC) setting and typically have longer LOS.	● Patient LOS and acuity is increasing, reducing access to inpatient beds for new patients.	● Sufficient inpatient capacity to accommodate demand for patients requiring tertiary level care.
f.	**Increasing Demand for Cancer and Cardiac services**	● Cancer and cardiac care make up a significant portion of inpatient care provided at MGH	● Demand for cancer and cardiac care is increasing. ● Patients are not receiving care in appropriate inpatient units staffed to address their specific clinical needs	● Increase capacity to cohort cancer and cardiac patients to improve outcomes.
Area		**Issue**	**Asserted Need**	**Proposed Impact**
Occupancy Rates				
g.	**Occupancy Rates (across service lines)**	● MGH is experiencing high occupancy rates (above 90%), which is above industry standards (below 85%).[60]	● High occupancy rates lead to increased wait times for an inpatient bed. ● Patients are not in the appropriate setting while waiting for an inpatient bed.	● Maintain sustainable occupancy rates that are in line with industry standards and provide the flexibility necessary to respond to peaks in utilization.

[60] Existing occupancy rate based on FY19 data. See Bed Summary Response.

Appendix III: Sample of Procedures Offered at the Heart Center

- Cardiac Catheterization[ss] – A minimally invasive procedure through which a narrow tube is inserted into the heart through an artery to examine heart functioning. Interventional catheterization to improve blood flow can be performed during or after a diagnostic catheterization or scheduled after if a blockage is found.
- Angioplasty (aka percutaneous coronary interventions)[tt,uu] – A procedure used to open clogged arteries. A tiny balloon catheter is inserted into a blocked blood vessel to help widen it and improve blood flow to the heart.
- Open Heart Surgery – Any type of surgery where the chest is cut open and surgery is performed on the muscles, valves, or arteries of the heart. Coronary artery bypass grafting (CABG) is the most common type of heart surgery done on adults.
- Transcatheter aortic valve replacement (TAVR)[vv,ww,xx] – A minimally invasive heart procedure used to treat aortic stenosis, a type of heart valve disease. TAVR replaces a thickened aortic valve that cannot open.
- Electrophysiology Studies (EP)[yy] – Testing the electrical activity of the heart to locate an abnormal heart rhythm or arrhythmia. Test uses catheters inserted in the heart to find abnormal heart rhythms.
- Extracorporeal membrane oxygenation (ECMO)[zz] – A specialized type of life support for the heart and lungs used to support patients with severe heart and lung failure until they recover or are able to go on long term support for transplantation. May be used when life support is needed after surgery or and in critical situations when the heart and lungs need help so that a person can heal. ECMO replaces the function of the heart and lungs. It does not treat a disease but provides help when the body cannot provide tissues with enough oxygen. It may be used for hours, days or weeks depending on the patient's condition.
- Heart Transplant[aaa,bbb,ccc] – A patient's diseased heart is replaced by that of a deceased donor to improve a patient's life span and quality of life. It is generally reserved for individuals with advanced heart failure when other alternative treatment options have not worked. May prolong survival of individuals with end stage heart failure by 10 years, and nearly 85% of individuals survive after the first year.

Appendix IV: Design Features

Design features to ensure that care is aligned with the unique needs of the aging population:

- Immediate access to assistance (i.e. greeters, information, wheelchairs) will be available at each building entry point, and upon exiting elevators on every patient care floor.
- Minimize by design the number of steps that a patient needs to take to arrive a place of care and/or place of assistance
- Lighting designed to assist patients in finding their destinations, illuminating signage, and reduce glare.
- Entry vestibules and light-filled lobbies provide a transition space for aging eyes to adjust from bright exterior to interior lighting.
- Spacious corridors provide space for patients to navigate with mobility assistance devices.
- Corridor flooring materials are selected to reduce glare and reduce depth perception challenges for aging eyes.
- Available space for family members, so they can accompany and assist a patient in all patient care or consult areas.
- Monitors in all patient rooms and clinic exam rooms to support inclusion of families remotely through telepresence in patient care conversations.

Design strategies for an aging population that will assist patients with a full range of abilities:

- All doorways into any patient care area are a minimum of 4’ wide, allowing for the full range of wheelchair widths and mobility devices.
- Every patient, procedure, imaging, and treatment room is equipped with ceiling lifts to assist in transferring patients safely from bed to chair, or from stretcher to procedure table.
- Doors to patient rooms and clinic exam rooms are sliding doors with long pulls; allowing people of all mobilities to easily open the door with whichever appendage has the greatest strength (hand, arm, foot, leg).
- Every patient care room is equipped with devices that connect patients to translating services for ease of communication.
- Patient treatment areas are designed to limit the travel of noise into/between rooms which will provide better acoustic privacy and ability to hear/participate in conversations with caregivers.
- Building is designed with a sophisticated wayfinding system that provides multiple cues responding to multiple cognition conditions to assist people in their navigation (e.g., large, clear text, color, and lighting).
- The larger, more private rooms being proposed support the presence of patient companions. Having loved ones involved in care promotes understanding of patient education, successful adherence with periprocedural instructions, and family participation supports building a care plan that is in line with the patient’s goals and has been associated with patient safety.

Appendix V: Population Health Management

Population Health Management (PHM) Strategies

- **eConsults and eVisits**: eVisits are telemedicine modalities designed to avoid unnecessary in-person office visits, to promote convenience for patients, and save providers time in evaluating and managing patients. Primary care providers (PCPs) or other care providers initiate an eConsult in the EHR and then receive structured guidance from a specialist within three days. eConsults produce rapid access to specialist expertise, help to reduce unnecessary specialist utilization and improve access to care for MGH's sickest patients. MGB has widely adopted the appropriate use of virtual visits for patients in ambulatory settings and is supporting this mode of access by assessing the status and need of pre-discharge patients. MGB aims to understand the digital access and literacy needs of its patients to ensure all modes of care for patients are safe, effective, patient-centered, timely, efficient, and equitable.
- **Enhanced Recovery After Surgery (ERAS)**: A comprehensive, patient-centered, evidence-based approach to perioperative care for planned surgeries that empowers patients as partners in their care, reduces complications, improves outcomes, decreases hospital LOS and reduces costs.
- **Home Hospital and Mass General Brigham Mobile Observation Unit (MOU)**: Aimed at reducing hospital admissions and providing care in less acute settings. MGH Home Hospital Program and MOU provide home-based urgent care for patients experiencing acute medical events believed to be treatable with enhanced home care.
- **Integrated Care Management Program (iCMP):** The Applicant generates an iCMP dashboard with targets for metrics that include length of time from patient identification to iCMP enrollment and percentage of iCMP patients with a care plan. Targets are reviewed on a quarterly basis with local iCMP leadership and bi-annually with the broader Performance Advisory Committee. Local leadership meets weekly with the care team managers to review iCMP metrics and patient cases to ensure progress of patient goals. PHM monitors the percentage of iCMP patients who graduate and meet all of their goals. The Applicant states that on average, patients are enrolled in the iCMP for 28 months, with some patients for greater than 5 years. Patients are referred to the program through their PCP. Each primary care practice has an iCMP team embedded at the site.
- **Medicaid ACO**: As a part of the MassHealth ACO, MGH has established and implemented additional care management programming to meet patient care needs and improve care transitions and reduce preventable hospital admissions and ED visits.
- **Patient Reported Outcomes Measures (PROMs)**: PROMS seek to improve the care of individual patients through meaningful engagement in the patient's reported symptoms, functional status, and quality of life. These clinically validated questionnaires that are

collected through the Patient Portal or iPad. Responses are saved in the EHR system and can be reviewed by providers to support shared-decision-making and monitor longitudinal progress. MGB initiated an internal incentive program based on providers achieving desired levels of paired pre- and post-operative patient reported outcomes data for patients having knee, hip, and back surgery. One example is the use of the Preoperative PROMIS 10 physical function score to predict opioid dependence after lumbar fusion surgery.

- **Post Percutaneous Coronary (PC) PC Readmission Management**: Strategies to reduce avoidable 30-day readmissions after percutaneous coronary intervention, including readmission risk scores, patient education materials, optimized ED triage and real-time auto-notification system in ED/Observation units.
- **Procedure Order Entry (PrOE)**: Web-based IT application designed to assist providers in assessing appropriateness of surgical procedures in order to avoid inappropriate procedures, improve patient care, and reduce healthcare costs.
- **Shared Decision-Making Program**: Several decision-aid tools are used to assist patients when making decisions to pursue complex therapies, interventions, and procedures. The goal of the Shared Decision-Making Program is to ensure that patients are well informed, meaningfully involved in decision making and receive treatments that reflect their goals and preferences. The Applicant tracks patient utilization of the Program.
- **Skilled Nursing Facility (SNF) 3-Day Waiver**: Provides Medicaid ACO patients the opportunity to have a covered SNF stay without a 3-day inpatient stay normally required for SNF benefits.
- **Stay Connected Program (SCP)**: Provides a bundle of interventions pre- and post-discharge to improve care transitions of vulnerable patients at high risk of readmission based on high-risk indicator or clinical condition.
- **Transition Care Management Program**: Uses naviHealth tool to manage episodes of care for Medicaid ACO patients admitted to one of the MGH Collaborative SNFs through the Transition Nurse Case Manager working with the SNF Care Team, patient care and transitions home are coordinated and managed.
- **Variation**: Variation team provides analytic and reporting resources to show MGH clinician performance comparatively and over time in a variety of areas.
- **Virtual Visits**: A real-time, synchronous telemedicine modality between a patient and provider, using secure, health insurance portability and accountability act (HIPAA) compliant video software.

Appendix VI Additional Detail on MGH's Diversity and Health Equity Initiatives

Community Partnerships

- MGH's Multicultural Advisory Committee (MAC) provides advice on minority patients' experience of care at MGH; minority communities' perceptions of MGH as a provider and as a community member; and reviews new and existing programs or initiatives aimed at addressing disparities at MGH.
- MGH's Patient and Family Advisory Council (PFAC) which is discussed further in Factor 1e, community engagement.
- MGH is a member of three separate collaborative Community Health Needs Assessment (CHNA) processes in Boston, North Suffolk (Chelsea, Revere, and Winthrop), and Everett-Malden.
- Cancer Center Equity Program is an initiative to raise awareness about, provide access to, and help patients navigate clinical trials through community outreach and education, and financial assistance, established in 2016.

Diversity Resources

- Annual Report on Equity and Healthcare Quality (ARHEQ) is a yearly report to identify disparities on a yearly basis and build strategies to address them.
- MGH is testing an Emergency Department Interpreter Pilot Program which stations a Spanish-speaking interpreter in the ED during peak hours Monday through Friday to address timely access to and increase ED usage of interpreters.
- MGH's Department of Equity and Inclusion is working with MGB's Department of Quality and Patient Experience to examine options for increasing the number of translated materials available in the EHR for staff to provide to patients upon discharge for test preparation.

Benchmark, Plan and Evaluate

- MGH Center for Community Health Improvement conducts regular assessments of community health assets and needs and uses the results to plan and implement services that respond to the cultural and linguistic diversity of MGH's patient population.
- Disparities Dashboard. MGH Disparities Solutions Center and the Center for Quality and Safety created the dashboard of core measures that are reviewed regularly.

Reflect and Respect Diversity

- MGH Human Resources Department works to recruit staff from diverse backgrounds and groups and trains managers on how to achieve these goals.
- MGH Diversity and Inclusion Committee sets and guides the diversity strategy and identifies, supports, and funds key diversity needs.
- MGH Multicultural Affairs Office (MAO) promotes recruitment, retention and advancement of students, physicians, and researchers who are underrepresented in medicine.

- Diversity focused criteria have been added to the Trustee evaluation tool to guide selection of potential Trustees to the Board.
- Employee Resource Groups[61] support ongoing leadership development of diverse Staff.
- MGH Provides funding for several fellowships aimed at promoting diversity and funds and supports initiatives to support the development of diverse staff.

[61] The Association of Multicultural Members of Mass General Brigham, The Office of Women's Careers, The LGBT Committee, The Committee on Latino Initiatives, The Chinese Staff and Scientists Association, and the Employees with Disabilities Resource Group are some examples.

Appendix VII: Speakers at the Public Hearing

First Name	Last Name	Title and Organization
Peter	Slavin, MD	President, MGH
Joseph	Byrne	Executive Secretary/Treasurer, North Atlantic States Regional Council of Carpenters
Liz	Skidmore	North Atlantic States Regional Council of Carpenters
David	McDermott	Ten Taxpayer Petitioner
Michael	Burns	Business Rep, Sheet Metal Workers Local 17
Jacquelyn	McGurn	Co-Chair, Sisters in the Brotherhood Member, Mass. Building Trades Committee
Robert	Seger, MD	Executive Director of Emergency Medicine, MGH
Jay	Livingston	Representative, 8th Suffolk District
Sal	DiDomenico	Senator, Middlesex and Suffolk District
Brian	Brousseau	President and Business Rep, Roofers and Waterproofers Union Local 33 of New England
David	Ryan, MD	Chief of Hematology/Oncology, MGH Oncology, Clinical Director, MGH Cancer Center
Joseph	Betancourt, M.D.	Senior Vice President for Equity and Community Health, MGH
Brian	Doherty	Greater Boston Building Trades Unions
Susan	Dagher	MGH Cancer Center Patient and Family Advisory Council
Jack	Hammond	Executive Director, Home Base Program at MGH
Joanne	Cataldo	East Boston Neighborhood Health Center, on behalf of Manny Lopes
Mary	Vogel	Executive Director, Building Pathways
Francis	Callaghan	President, Massachusetts Building Trades Council
Laurie	Wallace	Health Resources in Action
Charles	Cofied	Community Outreach and Recruiting Coordinator, Carpenters Union
David	Rosman, MD	Associate Chair for Radiology, MGH
Paul	Biddinger, MD	Director, Center for Disaster Medicine, MGH
Ephraim	Hochberg, M.D.	Associate Clinical Director, MGH Cancer Center
Carrie	Stamos	General Patient and Family Advisory Council, MGH
Stuart	Murphy	General Patient and Family Advisory Council, MGH
James	Luisi	CEO, Federally Qualified Health Centers serving the North End, Waterfront, Beacon Hill, and the West End.
Jim	O'Connell, MD	President, Boston Health Care for the Homeless
Conor	Barrett, MD	Clinical Director, Cardiac Arrhythmia Service, MGH
James	Fleming	Business Agent, International Brotherhood of Electrical Workers Local 103

Bill	Kieffer	General Patient and Family Advisory Council, MGH Member, MGB Patient Experience Leaders Committee
Mike	Hess	Business Agent, Ironworkers Local 7
Frank	Murray	Ironworkers Local 7
William	Vietze	Ironworkers Local 7
Jim	Vaughn	Business Agent, Plumbers and Gasfitters Local 12
O'Neil	Britton, MD	Chief Medical Officer, MGH
Ali	Raja, MD	Vice Chair, Department of Emergency Medicine, MGH
Tom	Ambrosino	City Manager, Chelsea
Grace	Lichaa	Boys and Girls Club of Boston
Ellen	Maloney	Chief Operating Officer, Newton-Wellesley Hospital
Erica	Shenoy, MD	Associate Chief, Infection Control Unit, MGH
Debra	Burke	Chief Nurse and Senior Vice President for Patient Care, MGH
Joseph	Guarino	Director of Service, Painters District Council 35
Tom	Chmura	General Manager, Wyndham Boston Beacon Hill
Joseph	Garasic, MD	Medical Director, Cardiac Catheterization Lab, MGH
Kenzie	Bok	Boston City Councilor, West End and Beacon Hill

Appendix VIII: Summary of Public Hearing Comments in Support of the Proposed Project

Factor 1a. Patient Panel Need

1. MGH's Inpatients buildings were built in the 1940s and 1960s, and the buildings are not designed to be compatible with today's state-of-the-art, technology-driven patient care. Currently, 38% of inpatient beds are in private rooms while most of its national peers in academic medicine are at 100%. The low percentage of double rooms makes it difficult to cohort patients, to manage infection control, and to manage a high census. Bed blocking is needed in double-bedded rooms due to patient incompatibility.

2. Additional inpatient capacity is needed to relieve significant capacity constraints in inpatient beds.
    a. MGH provides access to specialized care that is not available elsewhere. Lower acuity patients are cared for in MGB's community hospitals, or they receive care in outpatient areas, so only the most acutely ill patients are being cared for at MGH. MGH expects this acuity to continue as it attracts those patients who have the most difficult clinical problems. These higher acuity patients need high-intensity care and additional patient equipment. Double rooms make care of patients challenging and difficult for clinical staff.
    b. Lack of private rooms is contributing to ED crowding and long wait times for patients. Patients requiring a private room wait much longer in the ED due to the low percentage of private rooms currently available patients who need admission are extremely sick, complex, and have a variety of medical, social, and psychological challenges, and many patients have infections and are carriers of certain pathogens like MRSA. Patients with more minor illnesses who need admission must wait for a bed on the inpatient floors. Patients with cancer care or cardiac problems needing admission to the Hospital, often have to board and wait for an inpatient bed. The COVID-19 pandemic emphasized the need to move individuals with weakened immune systems out of the ED as soon as possible. Vulnerable populations tend to use the ED disproportionately. Imaging is an essential part of the care provided in inpatient beds and as part of cancer and cardiac care/services. MRI in patients with pacemakers is done almost nowhere else within Massachusetts. Wait time to get an MRI with a pacemaker at MGH is six months. Having additional cardiac imaging for inpatients on campus is needed to be able to provide the community the cardiac care that they need.

3. Consolidation of services from the two Centers of Excellence will ensure patients have access to necessary technologies and treatments, and to efficient and patient-centered care. Disparities and inequities exist in cancer and cardiovascular disease. The Proposed Project will allow MGH to provide better, more accessible, and high-quality care to its diverse patient populations.

a. Cancer and cardiac patients need more services that are required for their conditions and the Proposed Project will include an expansion of those services.
b. MGH is implementing innovative systems of care in the new building.
    i. 24-hour Oncology Urgent Care Unit so patients can be cared for by oncologists, nurse practitioners and nurses without needing to use the ED.
    ii. MGH is expanding its use of genetically 20 modified cellular therapy, a new type of technology to treat cancer patients that doesn't involve radiation, chemotherapy or surgery and can cure some patients with lymphomas and leukemias.
    iii. MGH wants to increase the size of its Premiere Center, which offers the newest oncology agents, the first time they're being used clinically.
c. The proposed building will allow MGH to accommodate high-intensity cancer care in a much better fashion.
    i. MGH is moving low-intensity cancer care out to the community to create more space for high intensity cancer care, such as bone marrow transplant, CAR T-cell therapies, high-end surgeries, and clinical research.
    ii. MGH has been actively expanding its ability to provide cancer care close to home by expanding its services at Newton-Wellesley Hospital, as well as ambulatory facilities in Waltham and Danvers. Capacity to deliver these services at the Main Campus is limited - infusion rooms are at capacity, and there is limited ability to deliver IV chemotherapy at the hour of a patient's choice, in the daytime.
d. Cardiac patients experience long wait times for surgery due to high demand and limited operating room (OR) capacity. The building will offer state-of-the-art ORs and imaging and will also provide more infusion bays which will help to relieve the strain on the present facility, as more and more patients are receiving infusions as a part of their care.
e. The prevalence and incidence of patients with heart rhythm problems is increasing as the population ages. Understanding of these disorders has improved, and this has led to the ability to provide curative procedures for many patients. Care for many heart rhythm disturbances, can be provided locally to patients that previously would only have been able to access such care at a large, major academic center such as MGH. Complex heart rhythm issues have been increasing both regionally and nationally. These issues require fast procedural techniques and technology, as well as a multidisciplinary care approach at a major center.
f. Physical inpatient perioperative and procedural spaces need to be flexible enough to permit evolution of the technologies used to provide procedural care for very sick patients. The proposed design incorporates this strategy and as a result, MGH anticipates being able to discharge some patients sooner after their procedures have been performed. The hybrid procedural spaces are technologically advanced, while bringing flexible use for ultimate efficiency.

4. The building will accommodate patient need for both inpatient and outpatient services, the distinction of which is not always clear. The design of the building MGH to seamlessly transition patients between the outpatient to the inpatient settings and back and avoid sending people to the ED.

5. Disaster Preparedness. The proposed building will position MGH to better deal with pandemics in the future.
    a. Hospitals need to be able to surge their capacity and expand beyond their usual bed capacity (for ICUs, isolation capability, or overall bed capacity) in the face of other infectious disease emergencies like COVID-19 and mass casualty incidents. The building is designed to ensure that MGH can continue to provide care to patients in the midst of these threats into the future. In the designed building, the building's utilities are specifically protected, and so that it can double up and serve as a building refuge for evacuation of other patients in less resilient portions of the Mass General campus, to ensure that the building does not need evacuation and continues to care for patients.
    b. The ED at MGH is one of the busiest in the country and treats some of the most severely injured and critically ill patients in New England. MGH treated more COVID-19 patients than any other ED in the state.

6. Additional ways in which the Proposed Project will improve access to care
    a. New parking spaces will be used entirely for patients.
    b. The Proposed Project will improve patient access to care for union (North Atlantic States Regional 7 Council of Carpenters) members and the community.
    c. MGH is one of the few AMCs or hospitals in the area that accept TRICARE and VA patients based upon the poor reimbursements that they provide.

Factor 1b: Public Health Value

1. The Proposed Project will increase the number of private rooms.
    a. Private rooms provide better safety from falls and infection, deliver a higher quality of care, and are more patient-centric than double rooms.
    b. Private rooms allow for a family member or a companion to stay with the patient during their cancer inpatient stay, which provides a much more patient-centric and safe environment for that patient.
    c. Private rooms will help alleviate anxiety among patients and allow for better personal care.
    d. Private rooms will increase patient privacy, including for discussions about end-of-life. Better privacy will support security and HIPAA regulations.
    e. Additional inpatient capacity will decompress the ED, reduce wait times in the ED, and increase efficiency in patient flow through the ED.
    f. The design of workflows within the rooms can support good, excellent infection control practices.

2. In response to the murder of George Floyd, MGB launched United Against Racism (UAR), and MGH launched its Structural Equity Ten-Point Plan to combat structural racism inside and outside its walls, to improve access to and delivery of equitable clinical care and to commit to the economic advancement of its communities. Millions of dollars have been allocated to support these efforts to achieve a more just, equitable health care system.

Factor 1c: Efficiency, Continuity of Care, Coordination of Care

1. The space for the Cancer Center and Cardiac Care Center is designed with the latest technologies for treatments, and the close proximity of the two Centers will greatly enhance the patient experience and the services that can be provided.
2. "The purpose-built facility will unite clinicians, nurses, nurse practitioners, physician assistants, interventionalists, proceduralists, surgeons and technicians in an aspirational fashion, allowing the efficient delivery of the highest quality cost-sensitive care."

Factor 2: Health Priorities

Public Health Outcomes

1. MGH is the first and only private AMC in the nation to host an on-site clinic dedicated to homeless persons, especially those living on the streets.
2. The Proposed Project provides the opportunity to address food security, housing, and the service needs of the immediate neighborhood.
3. The Proposed Project will contribute to MGH's public health focus, promote population health, and support innovative community-based health delivery models.
4. MGH is an important site for acute care and specialty services for East Boston Neighborhood Health Center patients, and MGH was instrumental in providing care to the health center's COVID-19 patients in East Boston, Chelsea and elsewhere who were greatly impacted by the COVID-19 pandemic.
5. MGH supports community health center programming for substance use prevention among teens, and supports adults in need of treatment, youth prevention work and community coalitions, and supports community assessments.
6. The community benefits that Mass General offers to the community used to develop a program that was a pipeline for young people of color to really become engaged in STEM (the science, technology, engineering, math fields).

Delivery System Transformation

1. The Proposed Project will allow MGH to pursue its Anchor Institution strategy by
    a. Investing in local minority-owned businesses, minority suppliers and growing minority talent in communities. Hiring a diverse workforce to build the building

and using minority-owned and women-owned businesses to purchase supplies and other services.

b. Adapting the Project Labor Agreement to include provisions that increase diversity, equity, and inclusion, along the lines of the Anchor Institution model, to which MGH has committed.
c. Creating additional union jobs and will create new careers for hundreds of people from low-income and underrepresented communities. Union construction offers especially important career opportunities for women, and particularly women of color who bear the biggest brunt of both income and wealth inequality.
d. Addressing income inequality, which is very closely correlated to healthcare inequality and by providing living wage jobs with benefits, the project will help to reduce healthcare inequality in the region.

Factor 6: Fulfillment of DPH Community-based Health Initiatives Guideline: Overall Application

1. The CHI contribution of $94 million is on top of baseline spending on community benefit activities of up to $140 million per year.
2. COVID-19 pandemic has exposed deep inequities in the healthcare system and has strained the capacity of healthcare providers. The CHI contribution will support important public health priorities in the region.
3. Recommendation to devote funds to food insecurity in a systemic way with CHI contribution, recognizing that it has become an important issue.

Appendix IX: Names of People Who Submitted Written Comments

First Name	Last Name	Middle Initial	Title and Organization
Amy	Latimer		President, TD Garden
Barry	Sloane	R	Chairman, President, and CEO, Century Bank
Carl	Martignetti	J	Vice Chair, Board of Trustees, MGH Chair, President's Council, MGH
Cathy	Minehan	E	Arlington Advisory Partners Honorary Trustee and former Chair of the Board of Trustees of MGH
Joanne	Chang		Owner, Flour Bakery and Café
Christopher	Myers		Owner, Flour Bakery and Café
Marty	Martinez		Chief of Health and Human Services, City of Boston, Mayor's Office of Health and Human Services
Denise	Mallen		PFAC Member, MGH MGH Cardiac Patient
Betty	Blum	A	Director, President's Council, Dana Farber Cancer Institute
Jay	Walsh		Director, Downtown North Association
Grace	Lichaa		Senior Director of Healthy Lifestyles, Boys and Girls Club of Boston
Elizabeth	Corrigan		Resident of Boston
Howard	Horowitz	R	Professor, Massachusetts Institute of Technology Ex-Trustee, MGH
Jack	Hammond Brigadier General (ret.)		Executive Director, Home Base, a Red Sox Foundation and Massachusetts General Hospital Program
James	Mooney III	F	Trustee, MGH
Jana	Milton		Boston Resident
Jay	Ash		President & CEO, Massachusetts Competitive Partnership
JD	Chesloff		President & CEO, Massachusetts Business Roundtable
Jim	O'Connell		Boston Health Care for The Homeless
Jon	Sullivan	J	
Jonathan	Kraft		President, The Kraft Group Board Chair, MGH
Kevin	Maroni	J	Maxply Capital Management LLC
Lydia	Shire		Owner, Scampo

Lynn Health Task Force Ten-Taxpayer Group			TTG
Martin	Walsh	J	Former Mayor, City of Boston
Francis	Callahan, Jr.	X	President, Massachusetts Building Trade Council
Matthew	Smith	D	Patient, MGH Cardiology Department Heart and Vascular Patient and Family Advisory Council, MGH
Pam	Reeve		Member, MGH Anchor Committee Trustee, Mass General Physician Organization
Philip	Geary	G	Founder, PFAC for Heart Vascular Institute, MGH
John	Regan	R	President and Chief Executive Officer, Associated Industries of Massachusetts (aim)
Robert	Seger, MBA, RHIA, CCS	F	Executive Director, Department of Emergency Medicine, MGH
Scott	Collins		
Scott	Malkin		Member, MGH President's Council, Chairman, Value Retail PLC
William "Mo"	Cowen (Retired Senator)		Trustee, MGH Board Member and MGH Chair, MGH Anchor Committee
Susan	Geary	N	Founder, PFAC for Heart Vascular Institute, MGH
Teri	Fryer	M	
William	Austen, MD	G	Surgeon-in-Chief Emeritus, MGH Churchill Distinguished Professor of Surgery, Harvard Medical School Honorary Trustee, MGH
William	Kieffer, III	H	Resident of Boston, Member, PFAC, MGH, Member, Patient Experience Leaders Committee
Stevan	Goldin		10 citizen group spokesperson

Appendix X: Summary of Written Comments Regarding the Proposed Project

In support:

Factor 1a. Patient Panel Need

MGH needs new infrastructure to accomplish the following:

1. Address an aging infrastructure and inflexibilities in the existing structure.
    a. The majority of care at MGH takes place in some of the oldest buildings on campus. Only 38% of inpatient beds are in private rooms which is lower than some of their national peers. Private rooms are the industry standard and required by the Department of Public Health for new construction.
2. Accommodate evolving standards of care and technologies, and clinical equipment in use today.
3. Address capacity constraints across the MGH campus resulting in inefficiencies for patients and staff:
    a. A high percentage of double rooms (62%), resulting in the need to block beds for patients that require a private room. Bed blocking reduces inpatient capacity, and this in turn leads to overcrowding in the ED, where patients are experiencing long wait times and boarding due to insufficient bed capacity. The COVID-19 pandemic emphasized the need to move individuals with weakened immune systems, like cancer and transplant patients, out of the ED as soon as possible.
4. Enhance access to high-quality healthcare, and ensure access to such care in the community, and improve access for patients with high acuity needs, including patients with cancer and cardiovascular disease.
5. Enhance access to care through providing patients with parking which will be an asset for those who cannot take public transportation.
6. Increase capacity to accept transfer patients from community hospitals allowing MGH to better serve patients who require AMC level care and MGH's expertise and improve access to care for patients in the appropriate location.
7. Address increasing demand for cancer and cardiac services due to a growing aging population.
8. Accommodate the high level of care coordination that is required as advances in care have evolved cancer and cardiac disease into chronic diseases with patients living longer with these illnesses.
9. Co-locate complementary cancer and cardiac services, which are currently spread over multiple buildings, and reduce the need for patients to travel from one building to the next for tests, procedures, and doctor visits. This is especially impactful for patients who make frequent or multiple visits to the campus.
10. Provide patient-centric care and improve patient experience and satisfaction.
11. Accommodate the increasing number of patients who need ICU care for cardiac, neurological, and other reasons.
12. Enhance MGH's disaster preparedness and allow MGH to continue to serve the community and place a role in disaster preparedness.

a. The new facility will be designed to withstand disaster.
b. MGH was very active in the COVID-19 pandemic response.

Factor 1b: Public Health Value

The Proposed Project will improve health outcomes, quality of life, and promote health equity in the following ways:

1. The Proposed Project will increase the percentage of private rooms from 38% to 88%. Private rooms are considered best practice/standard of care in large hospital settings because of their benefit to patient care and health outcomes
    a. Private rooms encourage communication with the care team, offering space for essential equipment and technology, and providing room for family members.
    b. Private rooms improve patient safety, including prevention of infection, and patient falls.
    c. Private rooms provide care, comfort, and dignity and privacy for patients and their family members/caregivers.
    d. Private rooms provide better environments for the delivery of high quality of care and promote and enhance healing.
2. Co-locating cancer and cardiac services fosters patient convenience and comfort.

Factor 1c: Efficiency, Continuity of Care, Coordination of Care

The Proposed Project will improve efficiency and care coordination in the following ways:

1. Co-locating cancer and cardiac service will alleviate challenges patients have faced in navigating multiple care locations and increase the efficiency and effectiveness of these services and make it easier for patients to complete all other follow-up appointments required for their care. Co-locating care will allow patients to coordinate appointments on the same day.
2. Co-locating care will promote patient-centric care.
3. Additional inpatient capacity will increase efficiency and patient flow through the ED, including for patients that are waiting in the ED after being admitted.

Factor 1: f) Competition on price, total medical expenses (TME), costs and other measures of health care spending

1. The new building will enhance MGH's ability to provide high-quality care in Boston and throughout the Commonwealth, in an efficient and cost-effective manner.
2. Co-locating services will result in fewer trips for patients into Boston and a reduction in costs.

Factor 2: Health Priorities

Public Health Outcomes:

1. The Proposed Project will launch MGH's Anchor Program. The Anchor strategy is dedicated to addressing the social determinants of health (SDOH) and racial inequities and will devote resources to improving equity and diversity. The Proposed Project includes an intentional approach to employment, purchasing and construction, and

initiation of construction jobs that will create employment opportunities and include strong representation from women and minorities.

2. MGH engages in community partnerships to increase access to health education and prevention, vaccine education, and to support food access and security efforts. MGH is working in partnership to develop trauma and mental health programming that will incorporate a focus on the impact of the COVID-19 pandemic.
3. The addition of the new building will add greater opportunities for the Scholars Program with areas of study and jobs for teens within the community
4. MGH is the only private AMC in the nation to host an onsite clinic dedicated to homeless persons, especially those living on the streets.

Factor 6: Fulfillment of DPH Community-based Health Initiatives Guideline: Overall Application

1. The $94m CHI contribution will help vulnerable populations, address the social determinants of health (SDOH) including house, substance use, and behavioral health, which impact an individual's access to necessary health care services and their overall health, and whose importance has been underscored by the COVID-19 pandemic. The CHI contribution will address health disparities and other public health concerns and promote health equity and diversity.
2. Lynn Health Task Force, a registered Ten Taxpayer Group (TTG) stated that they do not oppose the application but noted the Applicant is undertaking an expansion at MGH while closing Lynn's only hospital when Lynn has substantial unmet medical needs. The TTG made a specific request concerning the CHI contribution the full description of which can be found in the written comments that are posted online.
    a. The TTG requests that an amount of the CHI funds at least proportional to the percent of the Patient Panel residing on the North Shore be allocated to the North Shore, and more specifically the area(s) of the North Shore with the greatest unmet health need. That amount, at minimum, would be approximately $10,540,000.

<u>Summary of Written Comments in opposition to the Proposed Project</u>

Factor 1: f) Competition on price, total medical expenses (TME), costs and other measures of health care spending

1. "Proposed Project is a healthcare cost super spreader"

Factor 2: Health Priorities

Public Health Outcomes:

1. MGH should be focusing on prevention and the underlying causes of poor health, including pollution, stress, poor diet, and sedentary lives.
2. Other issues that have not been adequately addressed include violence of all kinds, including domestic violence and gun violence; addiction; and the underlying conditions of poverty and racism.

Appendix XI: TTGs Overview

TTG Name	Date Registered with DPH	Representative	Requested Public Hearing	Requested ICA	Oral Comments Provided at Public Hearing	Written Comments
Ten Taxpayers Alliance	March 30, 2021	Elmer Freeman				
Lynn Health Task Force	March 1, 2021	Lara Gallant	✓			✓
Shields Health Care Group	February 25, 2021	Kerry Whelan	✓	✓		
None	February 26, 2021	Duane Lucia				
Wellforce	March 12, 2021	Rebecca Deusser	✓	✓		
None	March 12, 2021	Georgiana Tam	✓	✓		
None	March 12, 2021	Jane Leung	✓	✓		
None	March 13, 2021	David McDermott	✓		✓	
None	March 15, 2021	Joe O'Brien	✓			
1199SEIU	March 15, 2021	Elisabeth Daley				
Center Diagnostic Imaging	April 2, 2021	Bethany Allen	✓	✓		

Appendix XII – ICA data sources

Center for Health Information Analysis (CHIA) Data Sources

CHIA Hospital Inpatient Discharge Database – which includes discharges from Massachusetts General Acute Care Hospitals.

- 2015 through 2019 Hospital Inpatient Discharge Databases were used to examine trends in inpatient utilization at MGH.

Massachusetts All-Payer Claims Database (APCD) – All fully insured commercial health plans with membership in Massachusetts (including Medicare, MassHealth, and commercial health plans) are required to submit medical claims, including claim line level data on each adjudicated claim.

Inpatient Relative Price Data – Published annual analysis of relative prices intended to evaluate variation in reimbursement across providers after controlling for patient acuity, service mix, and health plan product differences.

- Relative price measures used as a proxy for measuring relative differences in reimbursement across hospitals within the same health plan network.

Centers for Medicare and Medicaid (CMS) Data Sources

Medicare Inpatient Prospective Payment System Tables

- To determine the relative rates paid to hospitals for providing inpatient care to beneficiaries enrolled in Original Medicare,
- Annual Impact File for information on hospital-specific adjustments to the national payment rates.
- Base reimbursement rates for inpatient hospital stays separately for each GAC hospital in Massachusetts.

Medicare Outpatient Prospective Payment System Tables

- Rates paid to facilities for providing outpatient care relative to Medicare reimbursement rates.
- Prices paid by commercial plans, Medicare health plans, and MassHealth managed care plans relative to Original Medicare reimbursement rates when estimating the price-cost effects of potential shifts in outpatient facility utilization patterns.

National Plan and Provider Enumeration System (NPPES)

- Maintains an updated database of providers in which each record reflects a unique NPI.
- Relied on the NPPES database in determining the ownership of facilities and each facility's ZIP Code.

Additional Data Sources

UMass Donahue Institute Population Projections (UMDI)

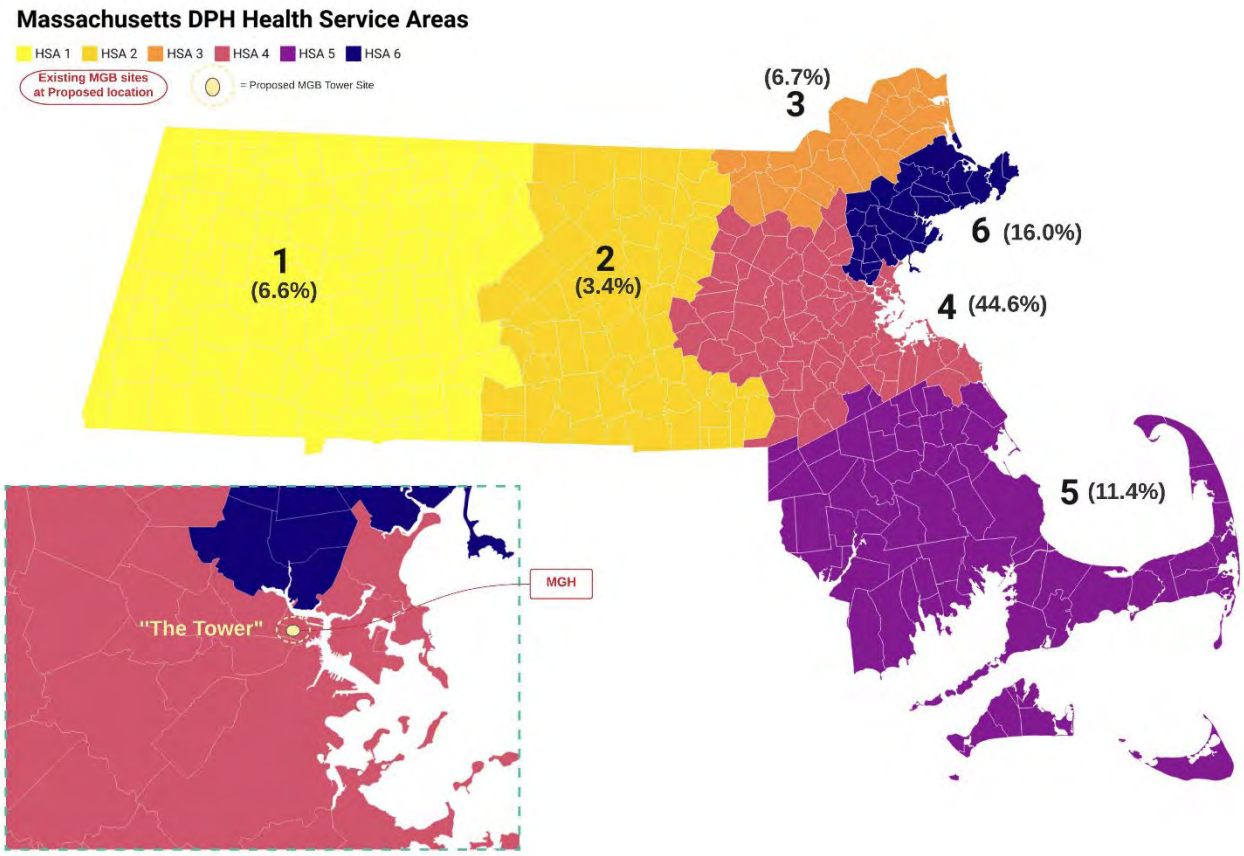
- Produces population projections for Massachusetts, with the most recently available estimates extending to the year 2040 in five-year increments.
- Modeling for demographic projections of patients residing in the service areas of the Proposed Project in 2025 and 2030.

Literature Review

CRA utilized existing literature to address several issues

- *Competition Between Health Care Providers*
  In assessing the effect of the proposed project on MGB's bargaining leverage, relied on a measure of hospital market concentration known as the Herfindahl-Hirschman Index ("HHI").
- The Relationship Between Hospital Concentration and Inpatient Prices
- Effect of Entry and Expansion on Competition in the Provision of Health Care Services
- The Potential for Supply-Induced Demand
- the effect of additional imaging capacity on demand for surgery and inpatient care
- The effect of reduced boarding time in hospital Emergency Departments or Post-Anesthesia Care Units
- Who bears the burden of higher costs or benefits from cost savings?

Appendix XIII: Health Service Areas (HSAs)



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